THE EFFECT OF PUBLIC POSTINGS ON EARLY CHILDHOOD CARE PROVIDERS' BEHAVIOR IN AN INFANT ROOM

BY

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PROVIDERS' BEHAVIOR IN AN INFANT ROOM

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Abstract

This study used a multiple-baseline design across two time periods to evaluate the effects of public posting on the quality of infant care in an early childhood program. The participants were 4 female caregivers. During baseline, a preexisting posted schedule of play activities was posted. During intervention, a new posting program was implemented that consisted of activity cards, an activity sheet, a caregiver rotation schedule, and caregiver instructions. Increased compliance with play area protocol (e.g., compliance with posted activity, toy rotation) and increased caregiver verbal and physical contact with infants was observed. The changes were largely maintained during follow-up. These findings (a) demonstrate that public posting can improve caregivers' compliance with play area protocol and their rates of contact with infants, (b) contribute to the literature on the usefulness of public postings as a means of improving staff performance, and (c) support the "zone" approach to classroom organization.

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An estimated 51% of infants spend a portion of their day cared for by someone other than a parent (Flanagan & West, 2004). Unfortunately, the quality of this care is often poor (Helburn & Howes, 1996; Phillips & Adams, 2001; Vandell & Wolfe, 2000). For example, in one of the largest studies examining the quality of care provided to children in out-of-home settings, 40% of the 225 infant and toddler rooms that were observed provided care that was of poor quality, 52% provided care that was of mediocre quality, and only 8% provided care that was of good or excellent quality (Cost, Quality, and Child Outcomes Study Team, 1995).

One factor commonly associated with high quality care is the educational background and training of the caregivers (Arnett, 1989; Burchinal, Cryer, Clifford, & Howes, 2002; Ghazvini & Mullis, 2002; Norris, 2001; Pence & Goelman, 1991; Roupp, Travers, Glantz, & Coelen, 1979; Saracho & Spodek, 2007; Tout, Zaslow, & Berry, 2006). Researchers, agencies, and associations in the field of early childhood often report the positive effects of caregiver training on quality of care. For instance, in 2007, the National Association for the Education of Young Children (NAEYC) concluded, "Research makes it *abundantly* [italics added] clear that early childhood educators with more professional preparation provide more developmentally appropriate, nurturing, and responsive care and education experiences for young children" (p. 1). This research may contribute, at least in part, to the increasing number of states that require in-service training, as well as the overall number of in-service training hours required for licensure and/or certification of caregivers

(Ackerman, 2004; National Child Care Information and Technical Assistance Center, 2008).

Unfortunately, although in-service training requirements have increased, the high turnover rates associated with the caregiving profession (up to 100% per year in some centers; Whitebook & Sakai, 2003) may preclude many caregivers from receiving training while employed at a center. Furthermore, those caregivers who do participate in training are unlikely to remain in the profession, as the yearly total replacement rate—the rate at which workers leave an occupation—is 32% for child care workers, which is double the national average (U. S. Department of Labor, 2004).

Caregivers themselves report a variety of obstacles that stand in the way of their participation in in-service training. These include inconvenient scheduling, lack of compensation to attend training, difficulty locating training, distrust of the trainers' ability and/or qualifications, and disagreement with the relevance of training topics (Ackerman, 2004; Brownlee, Berthelsen, & Segaran, 2007; Drake, Greenspoon, Unti, Fawcett, & Neville-Morgan, 2006; Gable & Halliburton, 2003; Rusby, 2002; Trawick-Smith & Lambert, 1995). In these same reports, caregivers express interest in training that is affordable and convenient, and that ideally results in some sort of acknowledgement of the training, for instance, certification or increased compensation. Infant caregivers, in particular, stress the importance of training that is practical and directly applicable to the work environment in which they are employed (Brownlee, Berthelsen, & Segaran, 2007). As one infant caregiver reported: "I think

in this industry, the best thing to do is the practical. It is easy to go to college and teach someone how to do this and how to do that. But when you actually get into the workplace, it is completely different. I found that with my first job here" (Brownlee, Berthelsen, & Segaran, 2007, p. 12).

Training that includes an on-site component may serve to address these obstacles and preferences. A recent review of the in-service training literature found that 54% of the 26 identified studies included some form of on on-site training, for example, training in the caregiver's daily work environment (Wosmek, unpublished manuscript). Such training is often included as part of an overall training package that has both off- and on-site components. On-site training procedures commonly entail coaching by an experienced trainer (Espinosa, Mathews, Thornburg, & Ispa, 1999; Flowers, Girolametto, Weitzman, & Greenberg, 2007; Girolametto, Weitzman, & Greenberg, 2003) or a peer mentor (Fiene, 2002; Uttley & Horm, 2008; Whitebook & Sakai, 1995). Other approaches include self-study materials, such as handbooks or videotapes (Aguirre & Marshall, 1988; Anderson & Gramann, 1997) and online training (Blasi & Broad, 2002; Guha, 2001). These on-site training procedures are a step in the right direction, but training methods that require any additional personnel, technology, and/or financial resources may be beyond the reach of many centers, hence the need for procedures that require less man power and resources.

Public Posting and Room Organization

Using public postings and alterations in room organization as a means to supplement in-service training has received little attention to date. Postings may serve

as a practical way to promote quality caregiving practices, supplementing in-service training or serving in lieu of such training. The following section briefly reviews the public posting literature and describes those studies that examined their effect on caregiver behavior. The next section describes research demonstrating the importance of room organization in early childhood settings, that is, caregiver-child ratios and designated caregiving responsibilities.

Public postings. In the behavior-analytic literature, posting signs that are visually accessible to the intended audience is commonly referred to as "public posting" (Nordstrom, Lorenzi, & Hall, 1990). Several mechanisms responsible for the changes associated with public postings have been proposed. Postings may function both as antecedents to clarify the desired behaviors (e.g., task clarification), discriminative stimuli to prompt desired behaviors and/or designate responsibilities, and as consequences to provide performance feedback. They are often used as part of an overall training package, but the relative effects of their components is rarely assessed (Nordstrom, Lorenzi, & Hall, 1990). However, those studies that used public posting alone have found it to be an effective way to change behavior, such as improving healthy food choices (Dubbert, Johnson, Schlundt, & Montague, 1984), decreasing volume levels of portable headsets (Ferrari & Chan, 1991), increasing office recycling (Austin, Hatfield, Grindle, & Bailey, 1993), and improving traffic safety (Austin, Hackett, Gravina, & Lebbon, 2006).

In work settings, public postings have been used as part of training packages to promote a variety of desired activities (see Nordstrom, Lorenzi, & Hall, 1990). The

bulk of this research pertains to food-service employees, where public postings have been used to improve employee banquet set-up procedures, such as setting up tables (LaFleur & Hyten, 1995); to increase the number of completed restaurant closing tasks, such as stacking dishes (Austin, Weatherly, & Gravina, 2005); and to increase customer service activities, such as making eye contact with customers (Loewy & Bailey, 2007; Squires et al., 2007). Other research examined the effect of public postings to improve cleaning tasks at a ski shop, such as cleaning countertops (Doll, Livesey, McHaffie, & Ludwig, 2007); to increase the number of residents engaged in scheduled activities, such as reading a book (Quilitch, 1975); and to increase the frequency of maintaining a student housing cooperative, such as cleaning common areas (Altus, Welsh, & Miller, 1991).

A review of the public posting literature identified only three studies that have examined the effect of public posting on caregiver behavior. One study evaluated the effectiveness of public posting on the behavior of 9 house parents working with children (Pommer & Streedbeck, 1974). In that study, weekly postings on a bulletin board itemized and assigned procedures and job duties to be completed over the course of the week, for example, cleaning the dishwasher and teaching a child hand washing. The study also examined the use of a token system in which house parents would earn $1 for each completed posted job. The findings indicate that, independently, both the postings and the token system improved compliance with house procedures and job duties. When postings and the token system were implemented simultaneously, the greatest gains occurred.

The other two studies that examined the effects of public posting on caregiver behavior took place in infant classrooms in day care settings. One study examined the effectiveness of public postings that prompted caregivers to reposition infants in the play area to help prevent posterior plagiocephaly, that is, a flattened back of the head (Cotnoir-Bichelman, Thompson, McKerchar, & Haremza, 2006). In that study, publicly posting the scheduled infant placement positions increased the frequency and variety of infant position changes to back, stomach, sides, knees, and standing. The second study described two experiments (Kunz et al., 1982). In the first, a chart posted near the diapering area prompted caregivers to check or change children's diapers each hour and fill in the box under the child's name, indicating the condition of the diaper (i.e., wet, dry, bowel movement). This procedure led to improved rates of checking and changing the diapers. The behavior was more consistent, however, when the posting was paired with supervisor feedback. In the second experiment, posting a play chart, play activity cards, and a performance feedback chart improved the caregiver-infant play interactions defined as "any obvious physical interactions between the child and caregiver during which the caregiver was: (a) within arms length of the child, and (b) facing the child or some portion of, or (c) facing a common object" (Kunz et al., 1982, p. 526). The improvements in caregiver-infant physical play interactions maintained over the course of 35 follow-up sessions. Answers on a social validity questionnaire at the end of the study indicated that both caregivers and parents were satisfied with the program.

The current study builds on this research, in particular on the Kunz et al. (1982), by examining the effect of postings on caregiver behavior in conjunction with a caregiver rotation schedule that specified which caregiver was responsible for the play area at a given time. While postings alone may produce positive changes in caregiver behavior, assigning caregivers the responsibility to engage in the posted behaviors may further increase the likelihood of their engaging in posted activities.

Room organization. Studies conducted in out-of-home child care environments suggest that higher caregiver-child ratios (i.e., the number of children per adult within a room or well-defined space) positively affect quality of care indicators associated with positive child outcomes, including child sociability, intelligence, and language (Howes, 1997; Howes & Rubenstein, 1985; Schipper, Riksen-Walraven, & Geurts, 2006; Whitebook, Howes, & Phillips, 1989; Howes & Hamilton, 1993). Low caregiver-child ratios, in contrast, can have a negative effect, which correlates with the age of the children; that is, the younger the child, the greater the impact of lower ratios on positive care indicators (e.g., fewer child-related educational opportunities, fewer caregiver-child interactions; National Institute of Child Health and Human Development, 2000; Phillips, Mekos, Scarr, McCartney, & Abbott-Shim, 2000). This may be due, in part, to the demands on individual caregiver's direct care of young children. Infants, for example, are generally diapered and fed as needed, and a child who is ill may require an even greater amount of caregiver attention. In contrast, older children have fewer direct care needs and may spend more time interacting with peers.

Traditionally, the literature on caregiver-child ratios assumes that the room is one caregiving unit, wherein children are simultaneously both cared for and supervised by the attending caregivers. Given the nature of infant care, however, this assumption may be inaccurate. Caring for a group of infants requires direct care responsibilities in higher numbers than caring for toddlers or preschoolers. A caregiver-child ratio of 1:3 in a room with 6 infants and 2 caregivers suggests that 1 caregiver is available for 3 infants at all times. In practice, however, 1 caregiver may be diapering an infant (a 1:1 caregiver-child ratio), while the other caregiver is putting an infant down to sleep (a 1:1 caregiver-child ratio). The ratio for the remaining 4 infants during this period is functionally 0:4.

Although this situation may sound extreme, direct care responsibilities for a group of infants cannot be overstated. Most infant rooms have diapering schedules that mandate that infant diapers be routinely checked every 1 to 2 hours and changed as needed. In addition, infants require more frequent feedings than do their preschool counterparts. Current guidelines recommend feeding infants on demand (American Academy of Pediatrics, American Public Health Association, and National Resource Center for Health and Safety in Child Care and Early Education, 2002). The guidelines also specify that infants should be held when fed. They should not be allowed to carry or sleep with a bottle, and caregivers are not to feed an infant by propping up a bottle on a blanket or other surface. Depending upon the age range of a room's population, most, if not all, infants require bottle feeding. Furthermore, the guidelines require that those on solid food also be provided direct assistance. Clearly,

caregivers spend a good portion of the day attending to ongoing direct care responsibilities in the room.

Because play, feeding, diapering, and sleeping areas are often separated in infant rooms, caregivers attending to an individual infant may be visibly or physically inaccessible to other infants. That means that when an infant is alone in another section of the room, opportunities for interactions are severely limited. Even in "open" rooms, that is, those in which all care is provided in a room arranged so that the caregiver has visible access to all the children (Twardosz, Cataldo, & Risley, 1974), the attention demanded by the target infant being put down to sleep, diapered, or fed precludes interactions between the caregiver and other infants. Again, given the nature of infant care, these situations occur so frequently as to be the norm rather than the exception. Therefore, methods that attempt to best utilize caregiver time need to be examined.

Over three decades ago, LeLaurin and Risley (1972) analyzed two approaches typical of caregiver assignments within preschool rooms. They termed the first approach "man-to-man," wherein one caregiver is responsible for the supervision of one group of children who participate in a variety of activities. They likened this configuration to "man-to-man defense" in sports. They termed the second approach the "zone," wherein caregivers are assigned to a particular area and assume responsibility for children in that area. As children finished a task, the children were sent to another area of the room and were supervised by a different caregiver. LeLaurin and Risley's (1972) findings suggested that the zone approach increases the

overall percentage of time preschool children engaged in activities. To date, this study has not been replicated. The rotation schedule implemented during the intervention portion of the current study evaluates the effects of implementing a zone approach to infant care. This schedule specified which caregiver was responsible for the play area and which caregiver was responsible for basic care areas (e.g., diapering, feeding).

Method

Overview

The current investigation examined the effect of two forms of postings and room organization on the activities of 4 caregivers employed in an infant room. A multiple-baseline design across two time periods was used to investigate whether public postings in the form of an activity program and caregiver rotation schedule would improve caregiver compliance with play area protocol and increase caregiver contact with infants. During baseline, a preexisting posted activity schedule consisting of activities and toys to be presented during specific hours of the day was posted, but no organized caregiver rotation schedule was in place. During intervention, a posted activity program consisting of activity cards, an activity sheet, and caregiver instructions was implemented, along with a caregiver rotation schedule that specified the caregiver responsible for the play area during a given time period. Trained observers recorded compliance with each form of public posting, along with caregiver rates of verbal and physical interaction with infants during each condition of the experiment. To assess the maintenance of this intervention, five follow-up observations were conducted 6 weeks after the end of the study.

The study was conducted at a not-for-profit child-care center located in a midsized midwestern community between March 24 and May 9, 2003. The observations took place on Mondays, Wednesdays, Thursdays, and Fridays from 10:00 a.m. to 5:00 p.m. Observations were not conducted on Tuesdays. At the request of the center's director, the follow-up condition took place on five Wednesdays, beginning June 18, 2003 and ending on July 30, 2003. This study was approved by the University of Kansas Human Subjects Committee-Lawrence campus (HSCL # 13152).

Participants

Participants in this study were child care providers and the infants in their care. The following is a description of both groups.

Child care providers. Before the study began, 4 female caregivers employed at a daycare center and assigned to the infant room agreed to participate in the study during baseline and intervention (Table 1). At the onset of the study, Caregiver 1 had been working at the center for approximately 1 year, and in the infant room for 3 weeks. Caregiver 2 had been working in the infant room for 1.5 years and was working on a degree in elementary education. Caregiver 3, the lead caregiver, had been working at the center for 9 months, of which 6 months were in the infant room. Caregiver 4 had been working in the room for 1 week and had previously worked at a university day care center for one semester. Each caregiver signed a consent form (Appendix A). Two of the 4 caregivers were observed during follow-up (i.e., the 21 and 19 year old caregivers; Table 1); the other 2 caregivers were no longer providing

care in the room. According to reports from the center's director, the caregivers did not participate in any other training activity over the course of the study. Six additional center employees periodically substituted for the 4 primary caregivers in this room and also participated in this study. They also signed the consent form. However, their data are not reported because of the brevity of their time in the room. The center's director and assistant director gave oral permission to conduct the study.

Infants. Ten infants participated in the study, six at one time, over the course of the study. They were ages 2 to 12 months (M = 7 months; Table 2) and reported to be at age-appropriate developmental levels. All infants enrolled at the center over the course of the study participated in the study. To maintain the room's group size capacity (i.e., 6 infants), any infants who permanently left the room were replaced by others, who were then included in the study (e.g., when an infant became old enough to receive care in the toddler room, an infant new to the center joined the room). The infants' parents signed a research consent form prior to the onset of the study or, for new infants, prior to their inclusion in the study (Appendix B).

Setting

The Child Care Licensing Division of the county Health Department licensed the room for the care of 6 infants, ages 2 weeks to 12 months, with a caregiver-child ratio of 1:3. Throughout the study, six infants were enrolled at the center. They received care in a room that was organized into clearly defined diapering, feeding, play, and nap areas (Figure 1).

Procedures

A preexisting schedule of play activities that was posted before the onset of the study was used as the baseline. The schedule listed activities and toys to be presented during specific hours of the day (Figure 2). It was posted on the south-facing wall by the door of the room and was printed on a white 8.5-in. by 11-in. piece of paper. While not stated explicitly on the schedule, the center's director and the lead caregiver, the 21-year-old with an associate degree in early childhood, reported that the play area protocol also involved rotating the toys hourly. They also reported that the play area protocol involved the lead caregiver posting a new schedule of activities and toys each week.

Before the study began, the center's director and assistant director reported their concerns to the experimenter that the play area protocol was not being followed. For example, they noted that the caregivers did not engage in the posted play activities and that the same schedule of play activities had been posted in the room for 4 months. Also, the center's director requested that any planned program changes be self-contained; that is, she preferred that the play area protocol require little to no up-front training and require little effort to maintain.

Dependent variables. The dependent variables in this study fall into two broad categories: caregiver compliance with play area protocol and caregiver contact with infants. For the category of caregiver compliance with play area protocol, four dependent variables were: (a) caregiver rotation, (b) posting of play activity, (c) caregiver compliance with posted play activity, and (d) toy rotation.

Caregiver rotation was defined as a correspondence between the caregiver identified on the posted rotation schedule during the intervention and the caregiver who actually performed the activities. Caregiver rotation was not recorded during baseline because no means were available for identifying which caregiver was supposed to be responsible for the play area. Posting of play activity was defined during baseline as the presence of the posted activity sheet that prescribed activities for all but 2 hours of the day (i.e., 10:00-11:00 a.m. and 4:00-5:00 p.m.; Figure 2). For those hours, the lead caregiver reported that caregivers were too busy either diapering and feeding infants, doing paperwork, or greeting parents to engage in scheduled activities. During intervention, posting was defined as caregivers posting activity cards on the bulletin board during the hour they were assigned to the play area. Caregiver compliance with posted play activity was defined as caregiver engagement in the posted activity with one or more infants in the play area. If the posted play activity involved specific toys (e.g., rattles, Figure 2), caregiver compliance was defined as the presence of the specific toys within the play area. Toy rotation was defined as caregivers putting away most of the toys in use and bringing new toys into the play area during the hour they were assigned to it.

For the category of caregiver contact with infants, the two dependent variables were: (a) caregiver verbalization toward an infant in the play area and (b) caregiver physical contact with an infant in the play area. The definition of verbalization specified that, as long as the caregiver was physically oriented toward an infant, the sounds need not be words or sentences. Humming to an infant, for example, was

recorded as a verbal contact. Physical contact with an infant was defined as contact between the caregiver and any part of an infant's body. Examples of this were holding, hugging, patting, kissing, and giving physical support.

Independent variables. The intervention portion of the study entailed two independent variables: a posted activity program and a caregiver rotation schedule. For the posted activity program, the program consisted of activity cards, an activity sheet, and caregiver instructions (Figure 3). The program was posted on the corkboard half of a 3-ft by 4-ft bulletin board hung along the east wall of the room. The other half was the dry-erase board used to display hourly caregiver rotation schedule. The activity cards described an activity and provided sample language to use during that activity (Figure 4). The activities were designed to be used with infants individually or in groups and were drawn primarily from the Active Learning for Infants (ALI) program (Cryer, Harms, & Bourland, 1987). Oral permission to use this program was given to the experimenter; each card cited ALI its source. The activity cards were stored in a wire basket hung under the corkboard section of the bulletin board and were posted on the upper portion of the corkboard (Figure 3).

The activity cards prescribed that caregivers initiate 73 different activities in eight categories: 8 using books (e.g., pointing to images in a book; Figure 4), 22 involving physical movement by the infant and/or caregiver (e.g., help infant to clap hands), 28 directed primarily at talking with the infant (e.g., responsive cooing), 11 involving singing or musical toys (e.g., singing a Hush Little Baby), 1 about taking infants on indoor or outdoor walks, 1 about taking infants outside to the wading pool,

1 about giving infants a special snack (e.g., animal crackers), and 1 about engaging infants in an organized art activity (e.g., finger-painting). These activities were chosen from the Cryer et al. (1987) book through consult with the center's director as appropriate and feasible activities for this room.

Caregivers were to identify the activity cards they used during each hour by writing the number and letter identification of the cards (e.g., "4B"; Figure 4) on the activity sheet posted at the bottom of the corkboard (Figure 5). The center's director wanted to ensure that the lead caregiver had creative freedom within the program to use all of the materials the center rotated among the other rooms, such as plastic activity gyms and large foam blocks. At the center director's request, the activity sheet had space for the lead teacher to specify which toys or materials that she would like for caregivers to use in the room that day. No analysis of the lead caregiver's engagement in this aspect of the program or of caregiver's compliance to these activities was included in this study.

An instruction sheet outlining the general tasks the caregiver was to do during her time in the play area was posted on the wall next to the bulletin board (Figure 6). The instructions specified that, upon entering the play area, the caregiver was to (a) get out new toys, (b) choose two activity cards and post them on the board, (c) engage each infant in the activity written on the posted cards, and (d) repeat these activities with infants or choose and post new cards. The instructions specified that when the caregiver's allotted time in the play area was nearing an end, the caregiver was to (a) write on the activity sheet which activity cards she completed with the infants, (b)

post the completed activity cards on the door of the room, and (c) put away toys and any uncompleted activity cards.

For the caregiver rotation schedule, the program consisted of a posted rotation schedule that served as a visual prompt for the caregivers to rotate on the hour from being primarily responsible for direct care duties (e.g., diapering, feeding) to being primarily responsible for posting and engaging in activities in the carpeted play area of the room. The rotation schedule was posted on the dry-erase half of the bulletin board (Figure 3). Posting the caregiver schedule on the dry-erase surface was chosen to give the caregivers the flexibility to change the schedule as circumstances warranted (e.g., if the lead caregiver had a meeting with a parent). During baseline, no organized rotation schedule for caregivers was in use and caregivers were free to choose where to spend their time in the room.

Observers

Five female undergraduate students were observers for this study; the experimenter was the reliability observer. Each undergraduate student received two college credits for participating in this study. Observers were trained in three phases. First, the experimenter met with the observers as a group to review the observation protocol for the center and discuss the operational definitions of the dependent variables. Second, the experimenter met with each observer individually on three occasions, at another center, to train them in observing the dependent variables. Third, also at the other center, the observers participated in a 2-week pilot study in which they practiced scoring the dependent variables. During this time, they achieved

an interobserver agreement (IOA) of at least 80% on each measure; IOA was also assessed during the study. Throughout the course of the study, the experimenter answered questions and responded to concerns about the observation protocol and dependent variables as caregivers presented them.

Observational Protocol

Direct observations of caregiver and infant behavior were made of the two dependent variables: caregiver compliance with play area protocol and caregiver contact. For all observations, observers positioned themselves against the wall between the two doors of the linoleum area facing the carpeted area (see Figure 1). To minimize their presence, observers were instructed to have their legs folded beneath them and bring only their observation materials into the classroom (e.g., the Palm Pilot III*e* and the 4”x7” clip board containing the compliance with play area data sheets). In an attempt to ensure that observations were as unobtrusive as possible, observers were also provided with guidelines outlining their overall conduct at the center (Appendix C).

Caregiver compliance with play area protocol. When observing the caregivers’ compliance with play area protocol, an hourly partial interval scoring system was used. Observers were to complete recording these observations on the hour (i.e., 11:00, 12:00). A wall clock in the room served as a visual cue for the onset of these observations. The observers used a pencil and 4”x7” data sheet (Figure 7) that was clipped to a small clipboard of the same size to record compliance with play area protocol. The dependent variables observed were (a) caregiver rotation, (b)

posted play activity, (c) caregiver compliance with posted play activity, and (d) toy rotation. The observation protocol and behavioral definitions for each of these variables are described below. Observations were to occur in the following order.

For caregiver rotation, observers were to record the name(s) of the caregiver(s) responsible for posting play activities for the hour. During baseline, this included all caregivers in the room during that hour, so rotation was not recorded. During intervention and follow-up, this was the caregiver identified on the rotation schedule.

Observers were to indicate on the data sheet whether that person was indeed the person primarily responsible for the play area. If caregiver rotation did not occur, that is, if the caregiver observed to be primarily responsible for the play area did not correspond to the caregiver identified on the rotation schedule, observers wrote “N” next to the caregiver’s name. Primary responsibility for the play area was determined by noting the caregiver who was most often observed interacting with children during the caregiver’s contact with infants observation sessions, described in the next section. Caregiver rotation was recorded for the hour as occurring or not occurring by writing next to the caregiver’s name on the data sheet “Y” for occurrence and “N” for nonoccurrence.

For posted play activity, observers were to record the play activity for that hour. During baseline, this was the activity or toys listed on the posted activity sheet. During intervention and follow-up, observers recorded the number and letter identification of the activity card posted on the corkboard section of the bulletin board

(e.g., 4B). During intervention and follow-up, observers also noted the time that activities were posted on the bulletin board.

Observers were to record whether the posted play activity occurred with any of the infants in the room. If the activity involved specific toys, they recorded whether the posted toys were present in the play area at any point for that hour. Because the scheduled activities during baseline were ambiguous prior to the start of the study, the experimenter and observers agreed upon examples of how these activities could be demonstrated in the classroom. In general, the activity was recorded as occurring if the caregiver engaged in any activity that could be reasonably construed as the scheduled activity. For example, if music originating from the infant room occurred during the hour scheduled for “CD’s” (Figure 2), observers were to record compliance with the posted activity. During intervention, compliance was recorded as occurring only if caregivers had engaged with any of the infants in the room in the activity as described on the posted card and use phrasing similar to that printed on the card. Caregiver compliance was recorded for the hour as occurring or not occurring per posted play activity by circling on the data sheet “Y” for occurrence and “N” for nonoccurrence.

For toy rotation, observers were to record whether toys were rotated during that hour (i.e., old toys put away and new toys brought out). They recorded rotation as occurring if the caregiver removed the toys in the play area and brought out new toys at any point during the hour. Toy rotation was recorded for the hour as occurring or

not occurring by circling on the data sheet “Y” for occurrence and “N” for nonoccurrence.

For informative notes, observers were to describe on the bottom portion of the data sheet any factors not covered in the preceding observations that might have influenced the quality of caregiver-infant interactions, such as the presence of parents or an infant’s illness.

Caregiver contact with infants. When observing caregiver contact with infants, observers were to begin recording observations on the hour when it was the observer’s first observation of the day or, for subsequent hours, to record contacts following completion of the caregiver’s compliance with the play area protocol data sheet. The observers used a Palm Pilot III*e* (Appendix D) to record caregiver contact with infants, using a program designed specifically for this study. Observations were recorded by touching the Palm Pilot III*e*’s stylus (i.e., a plastic pen used specifically for this device) to the designated area on the Palm Pilot III*e* screen. The dependent variables observed were caregiver verbalization toward an infant in the play area and caregiver physical contact with an infant in the play area. The observation protocol and behavioral definitions for each of these variables are described below and were to occur in the following order: participant identification, then verbal and physical contact.

For participant identification, observers were to record which caregiver was in the play area by selecting the caregiver’s name on the Palm Pilot III*e* from a list of room caregivers at the onset of each observation session. Each time a new caregiver

was observed, a new session was created on the Palm Pilot III*e*. However, the timer could be turned off and on during an individual session, for example, when the observed caregiver left the play area to talk to parents. If two caregivers were in the play area, the caregiver most engaged with the infants was selected on the Palm Pilot III*e*. If that caregiver left the area for more than 1 minute, the observer was to turn off the timer on the Palm Pilot III*e*, select a different caregiver in the play area to observe, and begin again. If no caregivers were in the play area, the observer turned off the timer, and waited for a caregiver to enter the area.

Next, observers were to record which infants were in the play area by selecting the infant's initials and the "IN" icon on the Palm Pilot III*e*. That infant's initials would subsequently appear to be underlined (Figure 8). When an infant left the play area, the observer selected that infant's initials and the "OUT" icon. When no infants were in the play area (e.g., all were sleeping or on a walk), the observer ended the session and noted this on the caregiver compliance with play area protocol data sheet. When a session was ended for personal reasons (e.g., observer using restroom), this was also noted on the data sheet.

For verbal and physical contact, observers were to begin recording observations on the Palm Pilot III*e* by turning the timer on. The Palm Pilot III*e* emitted a single audible chime every 15 seconds when the timer was on. Observers used a partial interval recording method, wherein each occurrence of verbal or physical contact was scored, regardless of the duration of the contact. The use of the 15-second interval length was determined prior to the study by the experimenter and

observers, by empirically evaluating different interval lengths and their effect on the observers' ability to accurately score behaviors and achieve adequate IOA (Sanson-Fisher, Poole, & Dunn, 1980). During the 15-second interval, observers recorded caregiver vocalizations when the caregiver was oriented toward an infant and when the caregiver had physical contact with an infant. The chime at the onset of the next 15-second interval cued the observers to record continuing verbalizations and physical contact. To record verbal and physical contact, observers selected the initials of the infant (e.g., AD) toward whom the contact took place and then selected either the "V" (verbal) or "P" (physical) icon. If an observer made a mistake when selecting either the infant or type of contact, she could select the undo icon (*), which erased the mistakenly entered information.

Interobserver Agreement

To assess IOA, a second observer simultaneously but independently recorded data on 19% of all occasions when the observers were present over the course of the study. Per condition, observers were present for 21% of all occasions during baseline, 16% during intervention, and 12% during follow-up. IOA for caregiver compliance with play area protocol and caregiver contact with infants was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying the resulting number by 100%. IOA for caregiver compliance with play area protocol was defined as two observers agreeing that the behavior either occurred or did not occur in a particular interval. IOA for room activities across observers were as follows: caregiver rotation, 100%; toy rotation, 98% (range, 96%-100%); posted

room activities, 100%; and caregiver compliance with posted activities, 97% (range, 94%-100%). IOA for caregiver contact with infants was calculated similarly. An agreement on the occurrence of a behavior was defined as two observers scoring that a behavior occurred within 15 seconds of each recording. IOA for caregiver verbalizations toward the infants was 96% (range, 93%-100%). Agreement for the occurrence of verbalizations was 66% (range, 58-100%) and for nonoccurrence 100%. IOA for the occurrence of verbalizations toward infants was 72% (range, 57%-100%) for Caregiver 1, 86% (range, 67%-100%) for Caregiver 2, 58% (range, 48%-100%) for Caregiver 3, and 71% (range, 69%-100%) for Caregiver 4. IOA for caregiver physical contact with infants was 94% (range, 90%-100%). Agreement for the occurrence of physical contact was 83% (range, 74%-100%) and for nonoccurrence 99% (range, 98%-100%). IOA for the occurrence of physical contact with infants was 86% (range, 81%-100%) for Caregiver 1, 78% (range, 69%-100%) for Caregiver 2, 80% (range, 73%-100%) for Caregiver 3, and 95% (range, 92%-100%) for Caregiver 4.

Experimental Design

A two-legged multiple baseline design across two time periods was used to assess the effects on caregiver behavior of a posted activity program and caregiver rotation schedule.

Experimental conditions. One leg of the baseline took place in the afternoon over the course of 2 weeks, while the second leg took place in the morning over the course of 5 weeks. During baseline for both legs, the experimenter asked caregivers

to engage in their normal room activities. To minimize the effect of the observer's presence on caregiver behavior (Kazdin, 1979), the experimenter told them that the observers were looking at infant routines in child care. The preexisting posted schedule of play activities in place during baseline consisted of activities and toys to be presented during specific hours of the day (Figure 2). The sheet was posted on the south-facing wall by the room door. The preexisting play area protocol called for hourly toy rotations, but did not assign caregivers to specific areas of the room. That protocol was not publicly posted, but was identified by the center's director and lead caregiver as the existing play area protocol for the room.

At the onset of the intervention for the first leg, the afternoon intervention, at the first available opportunity, the experimenter trained each of the 4 primary caregivers individually on the materials. Training took approximately 10 minutes. During that time, the experimenter explained the rotation schedule and the activities involved in posted caregiver instruction sheet (Figure 6). Afterward the experimenter answered questions about the materials as they arose during the study. The primary caregivers were also instructed to train substitute staff members. The observers posted the intervention materials (i.e., the corkboard and the play instruction sheet; Figure 3) at 1:00 p.m. each afternoon. At that time, the observers also took down the preexisting posted schedule of play activities. At 5:00 p.m. the observers replaced the preexisting posted schedule of play activities, took down the intervention materials, and stored them in the infant nap area behind an infant crib. For the morning

intervention, the intervention materials remained posted throughout the day, and the preexisting posted schedule was not posted in the room.

Social Validity Measures

To assess the social validity of the problems addressed in this study, such as caregiver activities and caregiver rotation (see Wolf, 1978), each caregiver was interviewed and asked 4 questions before the beginning of this study: (a) What would you like time to do more of? (b) What do you feel like you are doing a lot of? (c) What would you like to do less of? (d) Do you have any suggestions about how to improve the room? During the interview, oral responses to these questions were written down. In general, the caregivers said that they would like to have more time to play with the infants and spend less time on direct care responsibilities (i.e., diapering, feeding). They also reported a lack of room organization and engagement with the posted activities.

To assess the social validity of the intervention, caregivers completed a written questionnaire on the last day of the intervention, asking them to rank their satisfaction with the previous play area protocol and with the intervention play area protocol on a scale of 1 to 5 (1=unsatisfied, 5= very satisfied). Caregiver satisfaction with the previous protocol was 3 (no range), but 4.3 (range 3-5) with the intervention protocol.

Results

On the whole, caregiver compliance with posted room activities during intervention increased over baseline measures. As for caregiver contact,

verbalizations toward infants increased during intervention during both afternoon and morning time periods. However, little change occurred in the amount of caregiver physical contact with infants. Results specific to each dependent variable category follow.

Room Activities

The room activities observed on the hour (i.e., 10:00, 11:00, etc.) were (a) caregiver rotation, (b) posted room activity, (c) caregiver compliance with posted room activity, and (d) toy rotation. During the intervention, increases in each activity category occurred across caregivers, except for caregiver rotation. The findings for each activity category are described below.

Caregiver rotation. Across both the afternoon and the morning time periods, caregivers complied with the posted rotation schedule on 93% of all observed occasions during intervention and on 98% of all occasions during follow-up (Figure 9). No rotation schedule was in place during baseline. Across caregivers, in the afternoon, compliance with the posted rotation schedule during intervention was 94% (range, 75%-100%) and 95% (range, 75%-100%) during follow-up. In the morning, compliance with the posted rotation schedule was 90% (range, 33%-100%) during intervention and increased to 100% during follow-up. Caregiver rotation did not occur on five afternoons for one hour and on one morning for two hours because the lead caregiver was outside the play area, while the assistant caregiver stayed in the play area. No trends or unusual variability in compliance occurred. Thursdays had the least amount of caregiver rotation (79%; see Table 3). As for hour of the day,

caregiver rotation was least likely to occur in the last two hours of the day (i.e., 3:00-5:00 p.m.; see Table 4).

Posted room activity. Across the afternoon and the morning time periods, the number of hours with a posted activity in the room increased from 71% of all observed occasions during baseline to 84% during intervention, but decreased to 51% during follow-up (Figure 10). Across caregivers, in the afternoon, the mean percent of hours with a posted activity was 75% (range, none) during baseline; this increased to 86% (range, 50%-100%) during intervention, but decreased to 50% (range, 25%-100%) during follow-up. In the morning, the mean percent of hours with a posted activity was 67% (range, none) during baseline; this increased to 76% (range, 33%-100%) during intervention, but decreased to 53% (range, 33%-100%) during follow-up. During baseline, there was no variability in the average number of hours with posted activities in either time periods, because the same play activity sheet remained posted throughout the 5-week baseline (Figure 10). During intervention and follow-up, the average number of hours with posted activities became more variable, with decreasing trends during follow-up across both time periods. During intervention, caregivers were least likely to post activities on Fridays (69%; see Table 5). As for hour of the day, during intervention the 12:00 p.m. hour was least likely to have an activity posted in the room (57%; see Table 6); during follow-up the 10:00 and 11:00 a.m. hours were the least likely (60%; Table 6).

During intervention and follow-up, out of the eight card categories, caregivers most frequently posted physical activity cards. Physical activities were also those they

most frequently engaged in with the children. The two most popular cards involved having the infant play with a beach ball (i.e., a physical activity) and talking to infants about pictures in a book (i.e., a book activity). Each card was posted and the activity was engaged in on eight occasions. The snack category was the one least frequently engaged in with the infants.

Caregiver compliance with posted room activity. Across both the afternoon and the morning time periods, compliance with posted room activities increased from 11% of all observed occasions during baseline to 94% during intervention, and was 100% during follow-up (Figure 11). Across caregivers, in the afternoon, baseline compliance with posted activities was 11% (range, 0%-67%); this increased to 96% (range, 75%-100%) during intervention, and was 100% during follow-up. In the morning, compliance with posted activities was 10% (range, 0%-100%) during baseline; this increased to 91% (range, 68%-100%) during intervention, and was 100% during follow-up. Little variability in the rate of caregiver compliance occurred during intervention and follow-up, and there were no apparent trends (see also Tables 7 and 8).

Toy rotation. Across both the afternoon and the morning time periods, hourly toy rotation across caregivers increased from 15% of all observed occasions during baseline to 62% during the intervention, and was 45% during follow-up (Figure 12). Across caregivers, in the afternoon, the amount of daily toy rotation during baseline was 19% (range, 0%-50%) in the afternoon; increased to 72% (range, 0%-100%) during intervention and decreased to 58% (range, 0%-100%) during follow-up. In the

morning, the amount of daily toy rotation was 12% (range, 0%-67%) during baseline; increased to 33% (range, 0%-67%) during intervention, and was 38% (range, 0%-67%) during follow-up. The rate of caregiver toy rotation was highly variable during each condition. During intervention in the afternoon, a slight increasing trend occurred in toy rotation. In contrast, during the intervention and follow-up in the morning, and during follow-up in the afternoon, a slight decreasing trend occurred in toy rotation. During intervention, caregivers were least likely to rotate toys on Fridays (57%; see Table 9). As for hour of the day, during intervention the 10:00 p.m. hour was least likely to have the caregiver rotate toys (14%; see Table 10); during follow-up the 12:00 and 3:00 p.m. hours were the least likely (33%; Table 10).

Informative notes. On three separate occasions during baseline, observers reported on the informative notes portion of the hourly data sheet that no caregiver was present in the room. They were not absent from only the play area, but from the infant room as a whole. On one occasion, the notes indicate that infants were left unattended for 10 minutes. The length of time is unknown for the other two occasions. During intervention, observers reported no unattended periods.

Caregiver Contact

For caregiver contact, during each of the 15-second intervals, observers recorded caregiver vocalizations when the caregiver was oriented toward an infant and when the caregiver was in physical contact with an infant. Across both the afternoon and the morning time periods, verbal contact during the intervention increased from baseline rates, with the greatest change occurring during the

afternoon. The occurrence of physical contact, however, remained relatively the same throughout the study.

Verbal contact. Across both the afternoon and the morning time periods, the number of intervals with verbal contact increased from 15% of all observed intervals during baseline to 29% during the intervention, and remained the same during follow-up (26%, Figure 13). Across caregivers, in the afternoon, the mean number of intervals with verbal contact was 14% (range, 6%-24%) during baseline. It increased to 30% (range, 25%-34%) during intervention and remained nearly the same during follow-up (28%; range, 17%-49%). In the morning, the mean number of intervals with verbal contact was 15% (range, 10%-27%) during baseline. It increased to 26% (range, 4%-30%) during intervention and remained the same during follow-up (25%; range, 21%-32%). Variability in verbal contact increased somewhat in the afternoon during intervention, but not in the morning. A slight increasing trend in verbal contact occurred in both time periods during intervention; a slight decreasing trend occurred in both time periods during follow-up. Throughout the study, Thursdays had the least amount of observed verbal contact (i.e., 7% during baseline and 24% during intervention; see Table 11). As for hour of the day, increases in verbal contact occurred for all hours except the 12:00-1:00 p.m. hour (see Table 12).

Physical contact. Across both the afternoon and the morning time periods, the number of intervals with physical contact increased from 30% of all observed intervals during baseline to 35% during intervention, and decreased to 29% during follow-up (Figure 14). Across caregivers, in the afternoon, the mean number of

intervals with physical contact was 36% (range, 32%-40%) during baseline. It increased to 37% (range, 30%-42%) during intervention, and decreased to 29% (range, 24%-56%) during follow-up. In the morning, the mean number of intervals with physical contact was 25% (range, 22%-55%) during baseline. It increased to 29% (range, 28%-44%) during intervention and remained the same (28%; range, 26%-29%) during follow-up. Across both conditions, the caregivers' rate of physical contact with infants was somewhat variable. A slight increasing trend occurred during intervention in the morning, while a slight decreasing trend occurred during follow-up for both time periods. For all conditions, there was little difference in the amount of observed physical contact per day of the week (see Table 13). As for hour of the day, physical contact with infants occurred the most during intervention and follow-up during the 2:00 p.m. hour (see Table 14).

Discussion

This study used a two-leg, morning and afternoon, multiple baseline design to investigate the effects of two forms of public postings on caregiver behavior in a child care center. One form of posting was a schedule listing activities and toys to be presented as specific hours of the day. The other form of posting was a caregiver rotation schedule that specified the caregiver responsible for the play area for specific hours of the day and an instruction sheet outlining the general tasks the caregiver was to do during her time in the play area (i.e., post activity cards on the bulletin board, engage infants in posted activities, rotate toys). The findings were that the intervention led to positive changes in both room activities (i.e., number of hours with

posted play activities, caregiver compliance with posted activities, and toy rotation) and caregiver verbal and physical contact with infants. During baseline, the center had no caregiver rotation schedule. Consequently, observers recorded compliance with caregiver rotation only during intervention and follow-up conditions. During those conditions caregivers routinely complied with the posted rotation schedule. The number of hours with posted activities was stable throughout baseline because the same activity schedule was in place. The number of hours with posted activities increased during intervention. During both intervention and follow-up, however, the number of hours became more variable and decreased somewhat. Caregiver compliance with posted activities showed great improvement over baseline rates and remained high and stable throughout intervention and follow-up. Toy rotation improved considerably during intervention, although it was highly variable. During intervention, some decreases in the rate of toy rotation occurred in the morning period. During follow-up, decreases in toy rotation occurred during both the morning and afternoon periods.

As for caregiver contact with infants, little change occurred during intervention and follow-up. Specifically, verbal contact increased somewhat and maintained through follow-up; however, very little change occurred in physical contact, and no clear trends emerged. Across these categories of caregiver contact, more change occurred in the afternoon than in the morning.

Measures of the social validity of the problem indicated that caregivers wanted to spend more time playing with the infants and less time on direct care

responsibilities, such as diapering and feeding. They also requested more room organization and engagement with the posted activities. The intervention program appeared to address their concerns because it assigned responsibilities and provided structure to the play area. Also, satisfaction with the play area protocol increased slightly from baseline to intervention.

Limitations

In considering these results, several limitations deserve some discussion. They pertain to (a) the research design (e.g., the two-leg multiple baseline), (b) the nature of the intervention (i.e., a package program), (c) the nature of the dependent variable (i.e., quantity, not quality), and (d) the findings themselves (e.g., behavior change, variability, time of day). Details of these limitations follow.

Research design. This study used a multiple baseline design that involved only two legs (i.e., the morning and afternoon time periods), not the customary three legs, to examine the effects of the intervention on caregiver behavior. Including one additional baseline would have allowed for greater confidence in the effects of the intervention (see Barlow & Hersen, 1987). In this study, two time periods were used because they took advantage of the naturally occurring symmetry in the daily room activities. In this room, infants arrived in the morning and were taken home in the afternoon, occasions that involved similar caregiver activities (e.g., interacting with parents). Another point of symmetry was the format of the preexisting play schedule. That schedule included no activities for one hour in the morning and one hour in the

afternoon. Thus, including a third time period would have created a middle-time period unlike the first and last time periods.

Unfortunately, the research design had no reversal condition, which could have provided a greater demonstration of experimental control. Any return to baseline rates for the observed variables would have provided additional support that the intervention, rather than other factors, were responsible for reported changes (McBurney & White, 2007). Although a reversal was planned, during intervention the caregivers became increasingly uncomfortable with the observers' presence in the room. The center director did permit limited observations to continue on Wednesdays, but she refused a request to discontinue and then reinstate the program.

Nature of the intervention. Because the intervention was a package program, determining which of its components was necessary and sufficient to effect behavior change remains unknown (McBurney & White, 2007; see also Cooper et al., 1995; Wacker et al., 1990). Observing individual components could have provided data to help isolate the element most effective in producing the changes that occurred in caregiver behavior during this study.

Nature of the dependent variable. The caregiver contact data included an analysis of only the frequency of verbal and physical contacts, not the quality of the contacts that occurred. The original data collection system for this study included measures to qualify caregiver contact with infants, but the observers could not achieve sufficient interobserver agreement on those measures. Therefore, no data were collected on quality. Both the quantity and the quality of caregiver contact with

infants is important for both language development (e.g., rate of vocabulary growth; Landry, Smith, & Swank, 2002; onset of speech production; Huttenlocker, Haight, Bryk, Setzer, & Lyons, 1991; see also Hoff & Shatz, 2006) and fine and gross motor development (e.g., number of consistent hand-object reaches; Heathcock, Lobo, Galloway, 2008; see also Piek, 2006). Ideally, the study would have included an examination of the quality of caregiver contact with infants.

Findings. Decreasing trends during intervention were observed for toy rotation in the morning. Decreasing trends during follow-up were observed in both time periods for the number of hours with posted activities and toy rotation, and in the morning for physical contact with infants. In addition to these decreasing trends, increasing variability during both intervention and follow-up were observed for two variables: the number of hours with posting and toy rotation. Compliance was, however, high and stable throughout intervention and follow-up, which may indicate that decreasing trends and/or increased variability was not altogether negative. Instead, the trends and variability may reflect caregiver behavior coming under the control of play area circumstances (e.g., number of infants in play, disposition of infants in play). That is, caregivers may be learning to recognize appropriate opportunities for play activities and infant contact. For example, soothing a crying infant may take precedence over rotating toys or posting new activities. During follow-up, insufficient data make it impossible to determine whether the observations indicated actual trends or simply a continuation of ongoing variability appropriate for the given play area circumstances.

In general, across room activities and caregiver contact, more change occurred in the afternoon than in the morning. This may be due, in part, to routine activities that took place in the classroom in the morning. For instance, activities such as preparing and providing the noon meal for infants on solid food often pulled caregivers away from their play area responsibilities during this period. Those activities were in addition to the ongoing diapering and bottle-feeding responsibilities. Because of these additional responsibilities, no morning activities were scheduled from 10:00 to 11:00 a.m. during baseline. In contrast, afternoons involved fewer primary care activities that required more than one caregiver.

Whether caregivers complied with all aspects of the program—in particular, whether they posted completed activity cards on the classroom door and maintained the activity sheet—is unknown. Systematically recording such information during this study would have provided additional information on program compliance. Anecdotal reports from the observers indicated that caregivers did consistently post completed activity cards on the door of the room. Early in the intervention, the observers reported on the hourly data sheets that they saw both the center director and the infants' parents offer positive comments about the posted activities. However, observers recorded no systematic data on the occurrence of posting completed activity cards or any subsequent reaction from the center's director or the infants' parents. Compliance with instructions to post completed activity cards could have provided information about daily room activities to the center's director and the infants' parents. The postings could lead to a conversation between the director and

caregivers about suitable activities and/or set the stage for additional training. The postings could also encourage the center's director and/or the infants' parents to give social reinforcement to caregivers for completed tasks (see Newby & Robinson, 1983; Smith, 1995).

Whether the lead caregiver maintained the activity sheet (i.e., the sheet that allowed her to specify additional activities she would like to see take place in the play area) and whether caregivers complied with that sheet is unknown. Therefore, whether the activity sheet was an important aspect of the program is unknown. Based on the lead caregiver's failure to rotate the schedule for 4 months prior to the study and throughout the 5-week baseline period, her rate of engagement with the previous program suggests that she probably did not maintain the activity sheet during this study. The center's director requested the inclusion of the activity sheet in the program, and having the sheet posted may have given the director the impression that the lead caregiver was actively involved in ongoing maintenance of the play area protocol. That impression may have benefited the lead caregiver in terms of perceived job performance, but the validity of the director's perception is unknown.

Contributions to the Literature

The results of this study contribute to several bodies of literature, including those on (a) public posting, (b) room organization, and (c) data collection methods. Research has demonstrated the effectiveness of public postings on a variety of caregiver behaviors (Cotnoir-Bichelman et al., 2006; Kunz et al., 1982; Pommer & Streedbeck, 1974) and the "zone" approach to room organization with preschool aged

children (LeLaurin & Risley, 1972). This study demonstrated that the intervention—which included public postings and the "zone" approach—was effective in promoting caregiver compliance with play area protocol. The intervention was also somewhat effective in promoting caregiver contact with infants.

Public posting. This study demonstrated that postings contribute to caregivers' compliance with a play area protocol and caregiver rates of contact with infants. The baseline data demonstrated little correspondence between posted activities and what actually took place in the room. During intervention, all caregivers increased their compliance with posted room activities, toy rotation, and caregiver verbal contact. During this study's baseline, neither a staff assignment nor an activity description appeared in the preexisting posted play schedule, which provided only a list of activities to occur each hour. Such a list can easily be misunderstood by caregivers unfamiliar with the room, such as the "floaters" who take over during caregiver breaks. For example, an activity titled "CDs" (Figure 2) is open to interpretation by each caregiver. "CDs" may imply that caregivers are to play an audio book and page through the book with the infant, dance with infants to lively music, sooth infants to sleep with slow music, or offer empty CD cases to infants as a toy. Indeed, the last actually occurred during baseline. The developmental appropriateness of offering empty CD cases to infants is questionable. That this occurred during a scheduled "CDs" hour illustrates the importance of posting explicitly described activities and demonstrates the importance of task clarification, that is, specifying the target behavior and designating responsibility (see Austin, Weatherly, & Gravina, 2005;

Crowell, Anderson, Abel, & Sergio, 1988). Task clarification, when implemented as part of a public posting package, has led to increases in various other employee behaviors, including interactions between caregivers and infants during play (Kunz et al., 1982) and between house-parents and children (Pommer & Streedbeck, 1974).

Unlike the study reported by Kunz et al. (1982), this study found little change in caregiver physical contact with infants attributable to public posting. Comparing the two studies is difficult, however, because they differ on a number of points. For example, Kunz et al. (1982) collected observational data, on average, every 30 minutes, whereas this study used 15-second intervals. In addition, the differing caregiver:infant ratios in the two studies may also have influenced the observed rates of physical contact. In Kunz et al. (1982), 7 infants were cared for by 3 caregivers, which is a caregiver:infant ratio of 1:2.3. In contrast, in the current study, the caregiver:infant ratio was 1:3. Although Kunz et al. (1982) point out that one of the three caregivers collected data for the study and was therefore not a participant, presumably that caregiver (the room's supervisor) engaged in activities that would have otherwise fallen to the other two caregivers (e.g., diapering, paper work). Also, Kunz et al. (1982) included a feedback chart that reported caregiver's rate of engagement with infants. The current study included no such feedback. Finally, although Kunz et al. (1982) reported increases in caregiver-infant physical play interactions that maintained over the course of 35 follow-up sessions, the caregivers during follow-up were all new to the center. Therefore, to what extent the caregivers' rates of physical contact with infants is attributable to the activity program reported

by Kunz et al. (1982) is unknown, because no baseline data for those caregivers are reported.

Room organization. This study supports the "zone" approach in an infant room. During baseline, no single caregiver was responsible for the play area. During intervention, the caregivers consistently complied with the rotation schedule that assigned one caregiver to the play area per hour. Building on the findings of LeLaurin and Risley (1972), who reported measures of child engagement only during transitions, this study documents the positive benefits that this form of room organization can have on caregiver behavior. Here, both improved compliance with the play area protocol (i.e., engagement in posted activities, toy rotation) and improved caregiver verbal contact with infants were associated with the "zone" approach versus an approach similar to the man-to-man approach identified by LeLaurin and Risley (1972). Of course, because the intervention was a package program, the relative contribution of the "zone" approach is unknown. Without this component, however, caregivers were unlikely to engage in other aspects of the program (i.e., activity card posting, toy rotation, and contact with infants). Assigning a specific caregiver to the play area appeared to alleviate classroom confusion, because each caregiver was responsible for a particular area of the classroom. That responsibility appeared to make it more likely that caregivers would subsequently engage in the play area protocol.

Data collection methods. This study demonstrates the usefulness of palm-top computers for collecting observational data in an infant room. Both the rationale and

methods for integrating such technology into observational data collection have been suggested (i.e., Dixon, 2003; Gravlee, Zenk, Woods, Rowe, & Schulz, 2006; Jackson & Dixon, 2007); however, few studies have examined the actual use of palm-top computers. This study demonstrates that such technology can be used to reliably record verbal and physical behaviors of infant caregivers toward infants.

Several benefits of such technology for data collection in infant rooms are notable. The palm-top provided an unobtrusive means of collecting the observational data. The palm-top fit within the palms of the observers' hands and its use significantly decreased the number of paper datasheets necessary to collect the observational data. This potentially decreased the impact of observers on the behavior of the caregivers and infants (e.g., reactivity of assessment; Kazdin, 1979). Although laptop computers can be programmed to perform the same functions, they are significantly larger, and hence more cumbersome and possibly distracting for both caregivers and infants. The range of motion needed to enter data on the palm-top was minimal, and hence may have been less visually distracting to caregivers. Finally, when necessary, the palm-top was easily held out of the reach of inquisitive infants.

Benefits

A number of potential additional benefits and/or strengths associated with the intervention are worth noting. The intervention (a) improved the supervision of infants, (b) posed no threat to infants' safety, (c) addressed the concerns that caregivers expressed to the experimenter prior to the study, (d) distributed caregiving responsibilities, (e) gave each caregiver the freedom to choose activities and alter the

schedule as needed, (f) provided a convenient way to train and supervise caregivers, (g) may have provided center directors and parents of the infants a more accurate picture of the care being provided, and (h) provided parents an incentive for conversation with the caregivers. Some details of these associations follow.

Improved supervision of infants. The intervention increased the likelihood that a caregiver would be supervising infants in the play area. Before the study began, the center's director reported her suspicions that infants were frequently left alone in the play area. These suspicions were confirmed by the observers' informal observations and their anecdotal reports to the experimenter that caregivers left infants alone on three separate occasions during baseline. Currently, the second leading cause of complaints to state licensing agencies involves inadequate supervision (the leader is child:staff ratios; National Association for Regulation Administration and the National Child Care Information and Technical Assistance Center [NARA/NCCITAC], 2005). Substantiated complaints typically result in serious consequences for the caregiver and/or the center (e.g., revocation of a license, denial of a license, immediate closure of a facility; NARA/NCCITAC, 2005). Given the safety risks for unattended infants and the potential negative consequence for the caregiver and/or center, it would be wise to identify and maximize the program components responsible for decreasing the likelihood that infants may be left unattended.

Posed no threat to infant's safety. Intervention materials posed no threat to the infants' safety. Because infants are commonly positioned on the floor in play areas,

caregivers often need to be on or near the floor to have easy access to the infants (see Gratz, Claffey, King, & Scheuer, 2002). Infant caregivers use both hands for many activities, such as repositioning and lifting the infants. Having instructional materials posted out of infants' reach, but visually accessible to caregivers, is more convenient for caregivers and safer for infants than giving caregivers materials they must actively try to keep out of the reach of infants. Behaviors common to this age group, such as mouthing objects and drooling, preclude the daily use of handouts or workbooks in an infant play area. Keeping such potential choking hazards away from infants is commonly recommended (see Brownlie, 1998; Nash, 1993). Instructional materials accessible to infants who may put them in their mouths pose a danger of choking. Also, failing to keep instructional materials out of infants' reach can result in expense for a center that must replace materials that have been damaged by an infant and may bring a reprimand to a caregiver who placed infants at risk and/or allowed materials to be destroyed.

Addressed caregiver concerns. The "zone" approach to room organization appeared to address the concerns that caregivers expressed during interviews designed to assess the social validity of the problem. During those interviews, the caregivers each expressed feeling put-upon by being asked to engage in more than their fair share of direct care responsibilities, in particular, diapering. The "zone" approach assigned caregivers to particular areas of the classroom and equally distributed their caregiving responsibilities. Whether caregivers viewed that approach as addressing their concerns is unknown, because no measures were taken to assess

the validity of that assumption. However, the findings on the social validity measure suggest that the caregivers were generally satisfied with the intervention program.

Distributed caregiving responsibilities. Because the intervention distributed the caregiving responsibilities, it may be more likely to maintain. In other settings, such as student housing cooperatives, distributing responsibilities has been demonstrated as an effective means of helping to ensure program maintenance (see Altus, Welsh, & Miller, 1991). During this study's intervention, the caregiver responsible for the play area was in charge of posting activities during her time in the play area. During intervention, that responsibility corresponded with an increase in caregiver engagement in posted activities—an increase that remained high throughout follow-up. In contrast, the preexisting play schedule relied on the lead caregiver to post play activities. That schedule did not designate who was to engage in the activities, and caregivers rarely engaged in them.

Gave caregivers the freedom to choose activities and alter the schedule. The activity program allowed all of the caregivers to choose activities that interested them and/or that they felt were feasible under various room circumstances. With few infants in the play area, for example, the caregiver could choose activities suited to a small group (e.g., walking around the room with individual infants pointing out colors). In contrast, the preexisting posted play schedule gave caregivers no opportunity to accommodate room circumstances. Neither did it allow caregivers to choose activities that took advantage of their individual strengths or interests.

Interviews with caregivers suggested a positive association between their perceived control over curriculum and caregiver satisfaction and subsequent involvement in curriculum (Wong, 2003). The intervention's activity program and caregiver rotation schedule allowed the caregivers to alter the schedule as needed, as the classroom circumstances warranted within or outside of the play area. When the lead caregiver had extra paperwork to do, for example, during the intervention, she could schedule herself for two consecutive hours outside of the play area. Completing paperwork outside of the play area also made the play area safer for the infants, who otherwise would have potentially had access to paper that the lead caregiver was working on in the play area.

Caregiver satisfaction with play area protocol increased slightly from baseline to intervention. Interestingly, all of the caregivers gave the baseline play area protocol 3 points on a 5 point scale, despite baseline data indicating that they were not following that protocol. These results may be interpreted as an indifference to play area protocol. Such indifference, in turn, may indicate the need for additional caregiver training to improve caregiver-infant interactions and inform caregivers on the role postings can play in promoting those interactions. Reports indicate that training to improve caregiver's knowledge about quality care practices can result in a variety of improvements in caregiver behavior, including observed caregiver-child interactions (see Zaslow & Martinez-Beck, 2006).

Convenient means of training and supervision. For the center's director, the intervention program was relatively inexpensive and straightforward to create,

implement, and maintain. The cost of all training materials was under $100, which included the bulletin board; Cryer, Harms, and Bourland (1987) text; and all of the paper materials used for the signs and activity cards. All materials were published using simple word processing software and a laser printer. The program required no previous training courses or other in-service training; it was self-contained with the necessary information on the cards. The convenience of the program may make it attractive to center directors seeking to meet training needs for their infant caregivers. The program included brief instructions that individual caregivers could read in no more than 10 minutes. The program was easy to maintain because on-site caregivers could easily train new caregivers. In the current study 6 substitute caregivers were trained by the 4 primary caregivers. Although those data are not included in the current study, they showed a similar increase in room activities and caregiver contact following training.

In addition to acting as a convenient way to train caregivers, the intervention may also serve as a convenient way to train center directors. Because infant rooms are relatively new phenomena in the day care system (see Joesch & Hiedemann, 2002; Kreader, Ferguson, & Lawrence, 2005), some center directors may lack experience in caring for infants or in supervising those who do. Because the center's director plays an important role in the quality of care provided to children in a center (see Bloom, 1992), the activity program in this study may have served as a tool for director education. It also may have played a role in parent education (see Endo, Sloane, Hawkes, & Jenson, 1991; Glascoe, Oberklaid, Dworkin, & Trimm, 1998),

because parents who are new to infant care may acquire skills by reading the posted activity cards.

More accurate picture of care being provided. Increased correspondence between posted play activities and actual play activities gives parents and center directors a more accurate picture of what is taking place in the room. That, in turn, makes it easier to assess the adequacy of care. Informed directors may be more likely to fulfill their role as the "gatekeepers to quality" (see Bloom, 1992), and informed parents may be more satisfied with the care their infants receive (see Ledesma, Fitzgerald, & McGreal, 2006; Shpancer, 1998). During baseline, the preexisting posted play schedule was always present and may have masked the need for additional support in the play area. The posted schedule could have given the center's director and the infants' parents the faulty impression that caregivers were engaging in the scheduled activities.

Provided incentive for conversations. For parents, the intervention's public posting of activity cards may have created opportunities for them to talk with the caregivers about an infant's experiences. Many parents report lack of knowledge about what happens in an infant room (see Ledesma, Fitzgerald, & McGreal, 2006; Shpancer et al., 2002). Easily observed activity cards can offer parents evidence of the experiences provided during an infant's stay at the center. Few posted cards might indicate a difficult day in the room and could lead to a conversation about the specifics of the day's events. Thus, posting completed activity cards in a place easily

visible to parents could lead to useful exchanges between caregivers and parents that, otherwise, might never occur.

Future Directions

This study's findings lead to a number of directions for future research. Well-designed studies could provide information that would (a) identify frequency of interactions associated with quality care in out-of-home settings, (b) identify those activities associated with higher rates of caregiver-infant interactions, (c) determine the value of incorporating prompts and feedback into the intervention program, (d) assess how caregiver:infant ratios affect the rate at which caregivers comply with the intervention, (e) assess the generalization of play area behaviors to other areas of care (e.g., diapering area), and (f) assess whether the intervention has an impact on the rate of caregiver turnover. Some details of these future directions follow.

Identify frequency of interactions associated with quality care in out-of-home settings. To further identify the components of quality caregiving, future studies should attempt to identify the rates of caregiver verbal and physical contact with infants associated with quality infant care in out-of-home settings. The current study reported limited increases in both verbal and physical contact with infants; additional research could determine whether these rates were sufficient to produce the positive outcomes commonly associated with higher rates of such contact (e.g., onset of speech production; Huttenlocker et al, 1991). Although this study reported that caregivers most frequently posted physical activity cards, the findings showed little change in the rate of physical contact with infants. Physical activities were also those

activities caregivers most frequently engaged in with the infants. In light of these findings, why these data show no increased rate of caregiver-infant physical contact is unclear. The snack category was the least frequently engaged in with the infants. This may be because it was the only card in the category. It also involved providing the infants with a special snack, such as animal crackers, that was not part of the normal daily routine or menu.

Identify those activities associated with higher rates of caregiver-infant interactions. To improve the rate of verbal and physical contact with infants, future studies should identify play activities associated with higher rates of contact in infant group care. Some play activities may entail higher rates of contact or infant response, which may vary by the age of the infant (see De l'Etoile, 2006; Quilitch & Risley, 1973). Also, some activities may be more conducive to contact with multiple infants, thus maximizing the caregiver's time and effort (see Chase, 1992). Including more of such activities in an intervention program could make higher rates of contact more likely.

Available data on the naturally occurring rates of parent-child interactions suggest that the rates should be further increased. In their widely cited longitudinal study of parent-child interactions, Hart and Risley (1995) reported that the average family spent on average 23 minutes interacting with preverbal children and noted that at the "lower extreme was a welfare family that spent an average of 7 minutes per hour interacting with a child not yet saying more than a few words" (p. 66). While recognizing that the data reported in the current study are not directly comparable

because they reflect intervals of interaction as opposed to counts of utterances, comparing the difference is interesting. When translated into number of minutes per hour, the findings of the current study indicate that caregivers verbally contacted infants on average for 9 minutes during baseline, 18 minutes during intervention, and 16 minutes during follow-up. These findings suggest that throughout the current study, the amount of verbal contact in this center was below the normative amount of adult-child contact reported by Hart and Risley (1995).

Determine the value of incorporating prompts and feedback. To promote more significant changes in caregiver behavior, future research should investigate the effects of including verbal prompts and feedback in the intervention. Graphed performance feedback, for instance, may augment the prescribed tasks (Austin, Weatherly, & Gravina, 2005). In this instance, future researchers could investigate the effects of publicly posted feedback on caregiver compliance with an activity program. Those future researchers should, however, plan to transfer control of the verbal prompts or posted feedback from the researcher to the participants because feedback delivery may not maintain after a study is concluded (Austin, Weatherly, & Gravina, 2005). The activity program for this study had no provision for the lead teacher to give verbal prompts or written feedback, because the center director requested that the program be self-contained. Specifically, she preferred that it require little-to-no up-front training and require little effort to maintain. As in most U.S. centers, the center director reported to the experimenter that staff turnover is an ongoing challenge at the center where this study took place (see Whitebook & Sakai, 2003).

Frequent staff changes decrease the likelihood of maintaining programs that rely on a trained participant, in this case a trained lead caregiver, to deliver prompts or feedback. In applied settings where turnover is not an important consideration, however, examining the relative contribution of prompts and feedback could be useful.

Assess how caregiver:infant ratios affect the rate at which caregivers comply with the intervention. Because the number of infants being cared for in the play area may affect the caregiver's ability to comply with play area protocol, future research should examine the effect of group size on caregivers' compliance with posted activities. Although most research shows a positive correlation between caregiver:child ratios and quality care indicators, several studies offer contradictory evidence (e.g., Goelman & Pence, 1987; Kontos, Howes, Shinn, & Galinsky, 1995). These studies found that low caregiver:child ratios had a negligible effect on the quality of care provided. Factors pertaining to room organization or curriculum may account for some of these results. Some organizations or curricula may facilitate caregivers' ability to care for more children simultaneously.

Assess the generalization of play area behaviors to other areas of care. The rotation schedule and activity program may affect caregiver-infant interactions that take place outside of the play area (e.g., generalization; see Stokes & Baer, 1977). Therefore, future researchers should examine the effect of the schedule and posted activity program on those interactions. Increases in verbal and physical contact in the

play area may correlate to increased interaction in other parts of the infant room, for example, caregiver interaction with infants in the diapering or feeding areas.

Assess whether the intervention has an impact on the rate of caregiver turnover. Because equalizing the distribution of duties across caregivers may improve caregiver job satisfaction and subsequently reduce the rate of caregiver turnover (see Goelman & Guo, 1998; Granger & Marx, 1992), future research should examine the effect of the rotation schedule and activity program on caregiver retention. During this study's baseline period, which had no organized rotation schedule, caregivers freely drifted between two parts of the room—the play area and the care area. This appeared to discourage any clear division of caregiving responsibilities and led to difficulty in organizing room activities. During intervention, the rotation schedule assigned caregivers on the hour to either the care area or play area of the room. That schedule helped distribute caregiving responsibilities evenly. For example, no one caregiver was "stuck diapering" throughout her shift. Not surprisingly, diapering and toileting tasks are often rated as caregiver's least preferred activities (Kaiser, Rogers, & Kasper, 1993).

Conclusion

Taken as a whole, this study suggests that public postings in infant rooms may contribute to the quality of care provided to infants in day care centers. Thus, those working in early childhood settings are encouraged to consider public postings as a way to deliver on-site staff training and/or to maintain off-site training. Additional research could determine the extent of these contributions and which

program features are necessary and sufficient to produce positive effects on caregiver behavior.

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Appendix A

Caregiver Permission to Participate

INFORMED CONSENT

Introduction

I understand that I am being invited to participate in a study. The study will involve observations of the interactions between myself and the children in my care, followed by an intervention which will assist me in self-monitoring my distribution of interactions with the children in the infant classroom.

Purpose

The purpose of this study is to improve the distribution of caregiver attention within an infant classroom. The results of this study may assist caregivers in self-monitoring the attention they give to infants in a classroom and recognize opportunities for such interactions. It may also be used to facilitate training new staff in infant classrooms.

Procedures

During this study, data will be collected on the occurrence of caregiver-infant interactions, as well as antecedent and consequent events that occur prior to and following caregiver-infant interactions. The researcher will observe unobtrusively to minimize disruption to general classroom activities.

Alternatives to Participation

I can choose not to participate in this study.

Risks

There are no discomforts or risks associated with these observations.

Anticipated Duration of Participation

Observations will be conducted during 30 minute periods, nine times per week. It is estimated that each caregiver will be observed for no more than 30 hours.

Payment to subjects

None

Costs

None

Confidentiality

All research related records and information from this study will be kept confidential. Research results will only be presented to others using participant number or alias. Be assured that your name will not be associated with the research findings in any way.

Questions

I have read the information in this form. I know if I have any more questions after signing this form, I may contact Jennifer Wosmek by phone (785) 832-2827 or e'mail at Wosmek@swbell.net. If I have any questions about my rights as a research participant, I may call (785) 864-7429 or write the Human Subjects Committee, University of Kansas, Youngberg Hall, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563.

Consent

The investigators gave me information about what will be done in this research study. They also told me how the research will be done, what I will have to do, and how long the research will take. The investigators told me about any inconvenience, discomfort, or risks I might experience due to this research. I agree to take part in this study. I am aware that I may quit or refuse any part of the research study at any time. I know that if I have any more questions after signing this form, I may contact the investigators directly or the Human Subjects Committee listed above.

Jennifer Wosmek, M.A.
Principal Investigator
1812 Alabama
Lawrence, KS 66044
(785) 832-2827

Rachel Thompson, Ph.D.
Faculty Supervisor
Dept. of Human Development and Family Life
University of Kansas
4001 Dole
Lawrence, KS 66045
(785) 864-0526

_____
Print Participant's Name

_____ _____
Participant's Signature Date

"With my signature I affirm that I am over the age of eighteen and have received a copy of this consent form to keep."

_____ _____
Investigator's Signature Date

Appendix B

Parent/Guardian Permission to Participate

INFORMED CONSENT

Introduction

I understand that I am being invited to allow my child to participate in a study. The study will involve observations of the interactions between my child and their caregivers, followed by an intervention that will assist the caregivers in their care of my child and other children in the classroom. The study will be conducted in my child's classroom.

Purpose

The purpose of this study is to improve the caregiver-child interactions in an infant classroom. It may also be used to facilitate training new staff in infant classrooms.

Procedures

During this study, data will be collected on the occurrence of caregiver-infant interactions, as well as antecedent and consequent events that occur prior to and following caregiver-infant interactions. The researcher will observe unobtrusively to minimize disruption to general classroom activities.

Alternatives to Participation

I can choose not to allow my child to participate in this study.

Risks

There are no discomforts or risks associated with these observations.

Anticipated Duration of Participation

Observations will be conducted over the course of the week during the Spring of 2003.

Payment to subjects

None

Costs

None

Confidentiality

All research related records and information from this study will be kept confidential. Research results will only be presented to others using participant number or alias. Be assured that your child's name will not be associated with the research findings in any way.

Questions

I have read the information in this form. I know if I have any more questions after signing the consent form, I may contact Jennifer Wosmek by phone (785) 832-2827 or e'mail at Wosmek@swbell.net. If I have any questions about my child's rights as a research participant, I may call (785) 864-7429 or write the Human Subjects Committee, University of Kansas, Youngberg Hall, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563.

Consent

The investigators gave me information about what will be done in this research study. They also told me how the research will be done, what I will have to do, and how long the research will take. The investigators told me about any inconvenience, discomfort, or risks I might experience due to this research. I agree to take part in this study. I am aware that I may quit or refuse any part of the research study at any time. I know that if I have any more questions after signing this form, I may contact the investigators directly or the Human Subjects Committee listed above.

Jennifer Wosmek, M.A.
Principal Investigator
1812 Alabama
Lawrence, KS 66044
(785) 832-2827

Rachel Thompson, Ph.D.
Faculty Supervisor
Dept. of Human Development and Family Life
University of Kansas
4001 Dole
Lawrence, KS 66045
(785) 864-0526

_____
Print Participant's Name

_____ _____
Parent/Guardian Signature Date

"With my signature I affirm that I am over the age of eighteen and have received a copy of this consent form to keep."

_____ _____
Investigator's Signature Date

Appendix C

Observer Guidelines

In order to make our visits to the centers as unobtrusive as possible, we need to make sure all observers are following the same protocol. Please review the guidelines below.

1. Leave everything in your car, including coats, food and drink. Wear your ID badge. The only things you need are the palm pilot, the clip board, and a pen. Only data collection materials may accompany you into the center. Remember to take out with you what you brought into the center. Babies have a way of picking up items left behind.
2. Be cordial to all staff encountered, but avoid giving commentary to procedures or events as they occur in the room. This includes feedback such as facial expressions or laughter. Your goal is to become invisible in the room.
3. As much as possible, avoid eye contact with those you are observing. Be discreet. No one likes to feel they are being watched, so make it as comfortable for everyone as possible.
4. Do not interact with the infants unless they are in physical danger. Infants will ignore you if you consistently ignore them. This includes avoiding eye contact.
5. Assume an upright posture at all times. Remember, we are their guests. Folded legs is the preferred sitting position, as it limits the space we are taking up in the classrooms.
6. When necessary, move along the wall to have a better view, however do so discreetly, without interfering with ongoing classroom activities. As a rule of thumb, stay close to the wall.
7. Remember to say “thank you” after each visit. Again, we are their guests.

Additional Considerations:

- Park your car in the furthest spot from the front door, as those spots are for child drop off/pick up.
- Say hello upon entering the center and the room. The director or secretary will let you into the center.
- Shoes are to be placed in the cabinet. Make sure they are dry and mud free.
- Immediately take your place by the wall of the classroom. Cordially say hello to staff. Do not initiate interactions with staff or infants from that point on.
- When asked what we are looking at, be as general as possible. For example, you can say we are recording what infants do in center care.
- Do not look at fellow observers while observing.
- Do not discuss observations while at the center or leaving the center.
- Do not discuss children or staff with anyone outside of this project.
- Wear only pants for observations. No skirts.
- Always wear socks.
- Remember, we are their guests. Also, we are representing the University.
- If you are coughing, sneezing, or runny nose, please call a substitute observer.

Appendix D

Image of Palm Pilot III*e*

Palm Pilot III*e* (Actual Size)

Tables and Figures

Table 1

Caregivers

ID	Age	Education
1	17	High school diploma
2	19	2 years college
3	21	Associate degree in Early Childhood
4	22	3 years college

Table 2

Age and Sex of Infants

Age*	Sex
12	Girl
11	Boy
10	Boy
8	Boy
7	Boy
7	Boy
7	Girl
6	Girl
3	Boy
2	Boy

** Age in months at outset of study*

Table 3

Caregiver Rotation Per Week Day

Day	Intervention	Follow-up
Monday	95.5%	
Wednesday	100.0%	97.5%
Thursday	78.9%	
Friday	96.2%	

Table 4

Caregiver Rotation Per Hour of the Day

Time	Intervention	Follow-up
10:00 AM	94.4%	100.0%
11:00 AM	94.4%	100.0%
12:00 PM	100.0%	100.0%
1:00 PM	100.0%	100.0%
2:00 PM	94.4%	100.0%
3:00 PM	94.4%	66.7%
4:00 PM	88.9%	100.0%

Table 5

Posted Activity Present Per Week Day

Day	Baseline	Intervention	Follow-up
Monday	71.4%	86.4%	
Wednesday	71.4%	88.5%	51.4%
Thursday	71.4%	94.7%	
Friday	71.4%	69.2%	

Table 6

Posted Activity Present Per Hour of the Day

Time	Baseline	Intervention	Follow-up
10:00 AM	0.0%	71.4%	60.0%
11:00 AM	100.0%	100.0%	60.0%
12:00 PM	100.0%	57.1%	66.7%
1:00 PM	100.0%	94.4%	100.0%
2:00 PM	100.0%	88.9%	75.0%
3:00 PM	100.0%	83.3%	66.7%
4:00 PM	0.0%	77.8%	100.0%

Table 7

Caregiver Compliance to Posted Activity Per Week Day

Day	Baseline	Intervention	Follow-up
Monday	13.3%	100.0%	
Wednesday	0.0%	100.0%	100.0%
Thursday	10.0%	85.7%	
Friday	10.0%	87.5%	

Table 8

Caregiver Compliance to Posted Activity Per Hour of the Day

Time	Baseline	Intervention	Follow-up
10:00 AM		80.0%	100.0%
11:00 AM	20.0%	100.0%	100.0%
12:00 PM	5.0%	75.0%	100.0%
1:00 PM	22.2%	94.1%	100.0%
2:00 PM	0.0%	100.0%	100.0%
3:00 PM	11.1%	100.0%	100.0%
4:00 PM		85.7%	100.0%

Table 9

Toy Rotation Per Week Day

Day	Baseline	Intervention	Follow-up
Monday	14.8%	65.0%	
Wednesday	8.7%	70.0%	44.7%
Thursday	17.4%	81.3%	
Friday	13.8%	57.7%	

Table 10

Toy Rotation Per Hour of the Day

Time	Baseline	Intervention	Follow-up
10:00 AM	15.0%	14.3%	40.0%
11:00 AM	10.0%	57.1%	40.0%
12:00 PM	10.0%	28.6%	33.3%
1:00 PM	11.1%	66.7%	50.0%
2:00 PM	22.2%	83.3%	75.0%
3:00 PM	33.3%	72.2%	33.3%
4:00 PM	11.1%	61.1%	100.0%

Table 11

Verbal Contact Per Week Day

Day	Baseline	Intervention	Follow-up
Monday	17.2%	31.6%	
Wednesday	16.6%	33.7%	26.0%
Thursday	6.5%	24.0%	
Friday	12.1%	26.2%	

Table 12

Verbal Contact Per Hour of the Day

Time	Baseline	Intervention	Follow-up
10:00 AM	16.0%	37.3%	31.0%
11:00 AM	14.0%	26.6%	25.3%
12:00 PM	16.7%	14.8%	13.4%
1:00 PM	14.3%	32.6%	28.1%
2:00 PM	15.5%	31.4%	39.1%
3:00 PM	12.1%	30.0%	9.3%
4:00 PM	12.7%	25.2%	24.4%

Table 13

Physical Contact Per Week Day

Day	Baseline	Intervention	Follow-up
Monday	34.2%	35.3%	
Wednesday	28.2%	37.8%	28.6%
Thursday	27.8%	36.1%	
Friday	27.5%	31.4%	

Table 14

Physical Contact Per Hour of the Day

Time	Baseline	Intervention	Follow-up
10:00 AM	24.9%	37.6%	22.9%
11:00 AM	24.3%	33.1%	32.7%
12:00 PM	26.1%	14.2%	23.9%
1:00 PM	41.2%	33.9%	35.7%
2:00 PM	35.0%	43.9%	37.6%
3:00 PM	29.9%	32.9%	12.4%
4:00 PM	38.0%	34.2%	17.3%

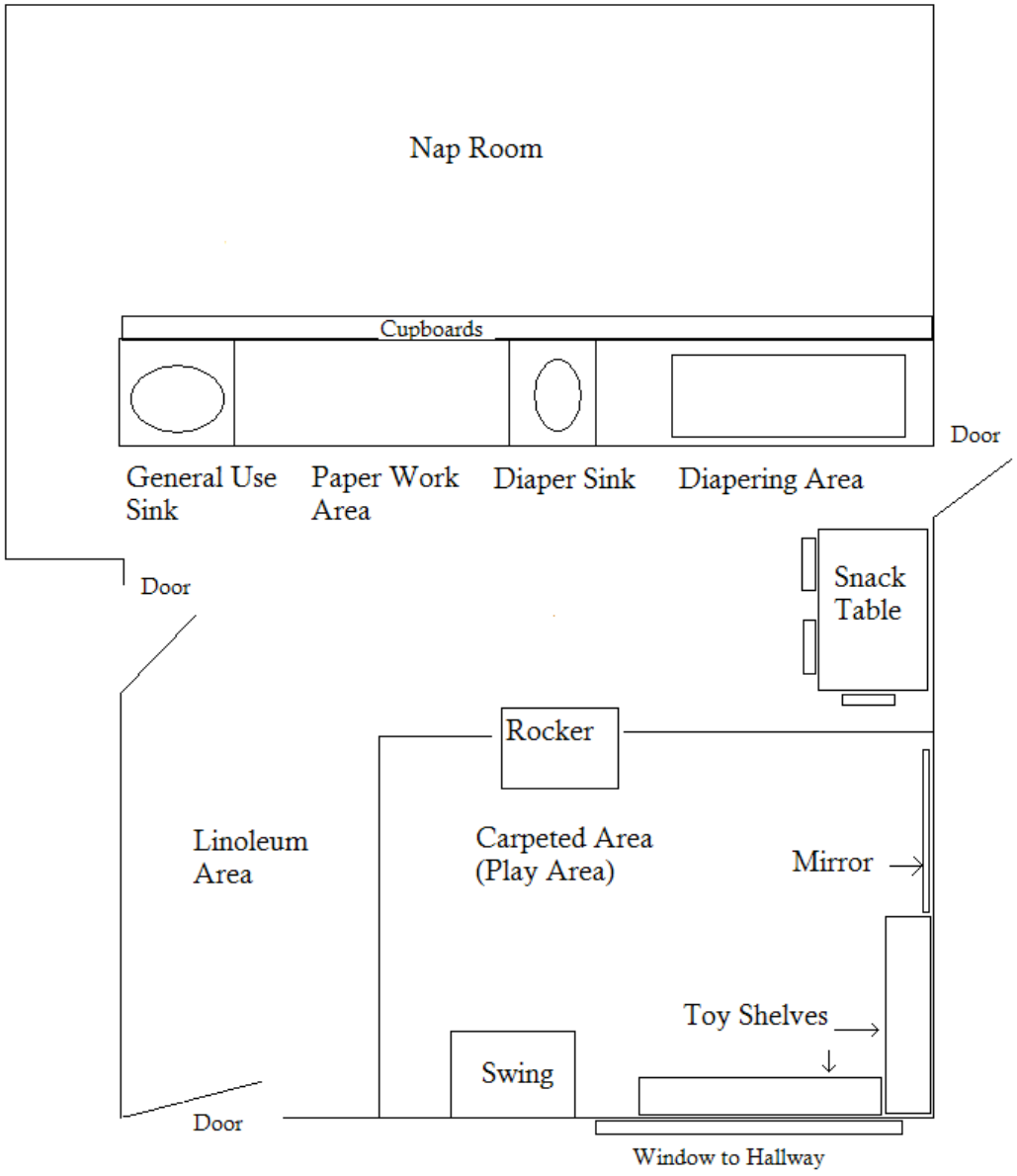


Figure 1. Diagram of the infant room (1”=4’).

Week of: *November 25*		**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
8:00-9:00	**Self-Directed Free Play**	Rattles	Pop beads	Oil bottles	Keys	Stuffed animals
9:00-10:00	**Music Activities**	Music boxes	Musical toys	CD's	Songs	Tapes
11:00-12:00	**Large Motor**	Tunnel	Kick gym	Tummy time	Walker car	Kick balls
12:00-1:00	**Small Motor**	Chew toys	Soft rattles	Bead balls	Soft books	Rings
1:00-2:00	**Social/language**	Books	Babbling	Hi and bye	Waving	Dancing
2:00-3:00	**Teacher Directed**	Bubbles	Peak-a-boo	Dress up	Restaurant	Visual tracking
3:00-4:00	**Self-Directed Free Play**	Balls	Noise makers	Frog and prince	Outside	Stroller ride

Figure 2. A copy of the preexisting posted schedule of play activities.

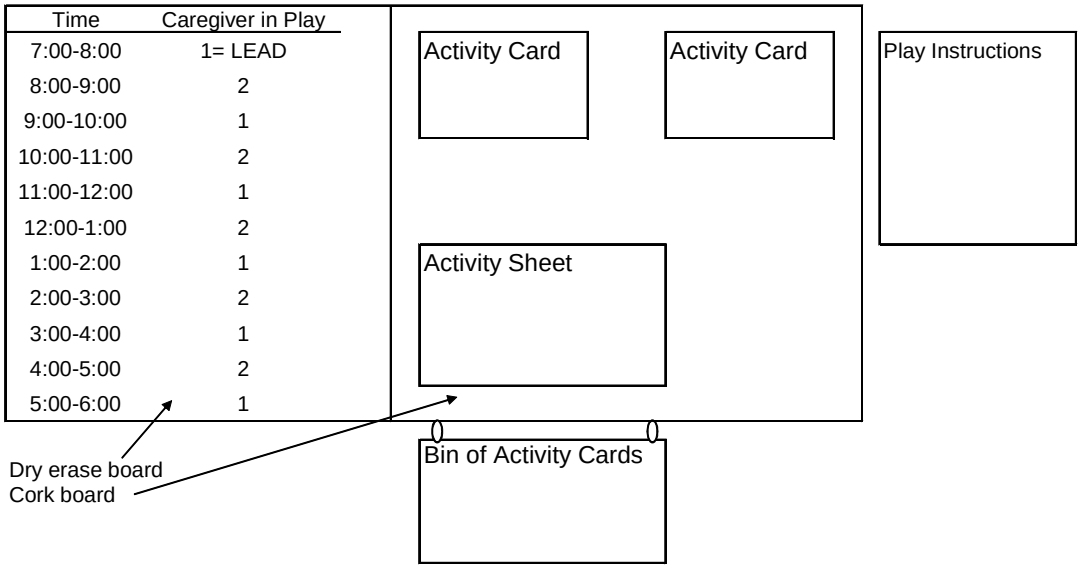
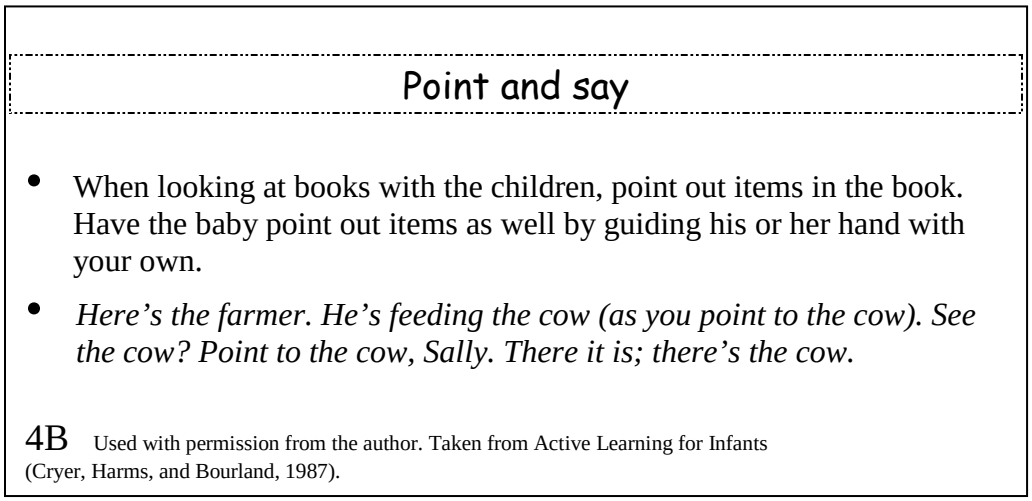


Figure 3. Diagram of activity program displayed on the wall in the room.

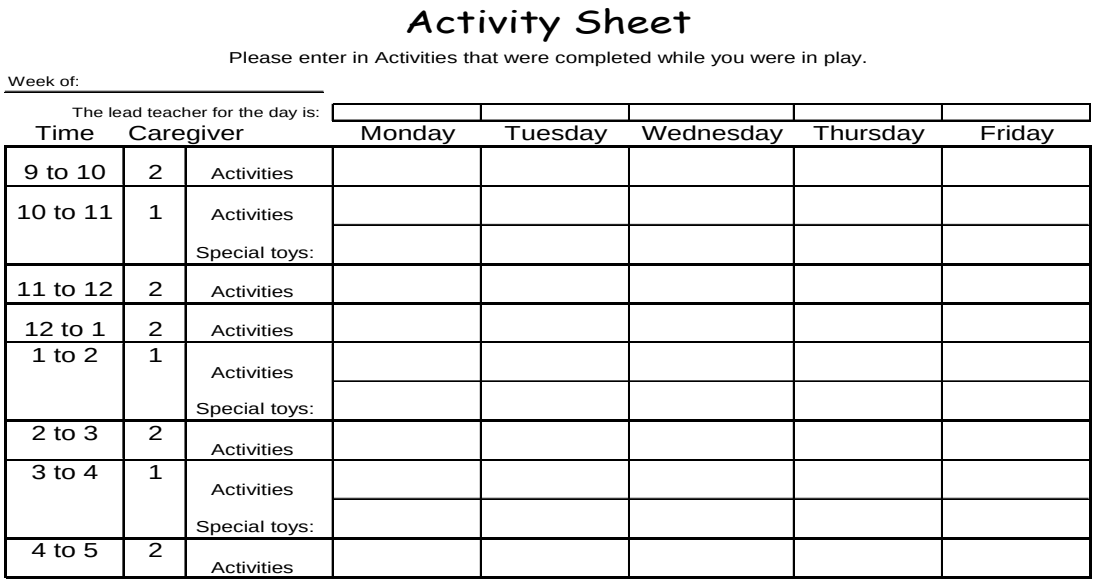


Point and say

- When looking at books with the children, point out items in the book. Have the baby point out items as well by guiding his or her hand with your own.
- *Here's the farmer. He's feeding the cow (as you point to the cow). See the cow? Point to the cow, Sally. There it is; there's the cow.*

4B Used with permission from the author. Taken from Active Learning for Infants (Cryer, Harms, and Bourland, 1987).

Figure 4. Example of activity card used during intervention.



Activity Sheet

Please enter in Activities that were completed while you were in play.

Week of:

The lead teacher for the day is:

Time	Caregiver		Monday	Tuesday	Wednesday	Thursday	Friday
9 to 10	2	Activities					
10 to 11	1	Activities					
		Special toys:					
11 to 12	2	Activities					
12 to 1	2	Activities					
1 to 2	1	Activities					
		Special toys:					
2 to 3	2	Activities					
3 to 4	1	Activities					
		Special toys:					
4 to 5	2	Activities					

Figure 5. The sheet used to report caregiver activities.

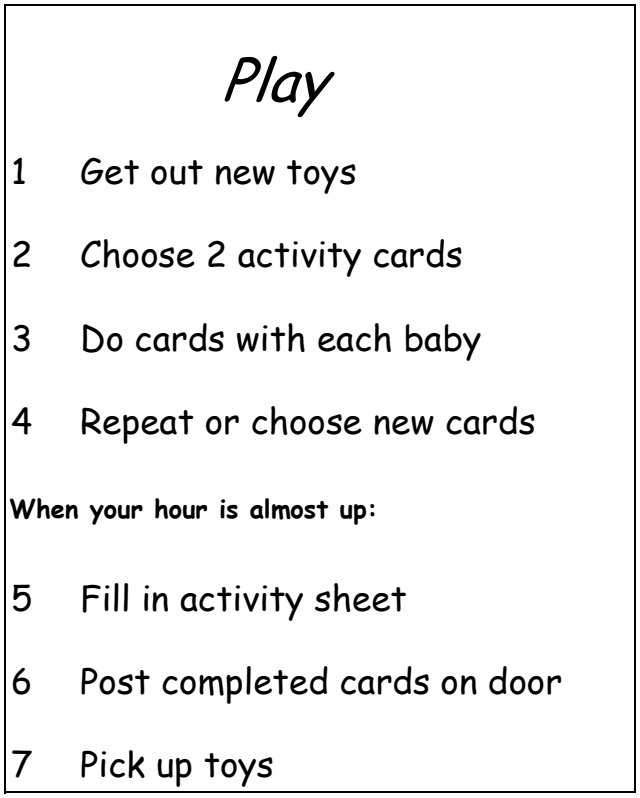


Figure 6. Instructions for caregivers in the play area, which were posted next to the activity card board on the wall of the room.

Wednesday

10 to 11 Name:_____ Observed: _____

Posted activity: _____ Time posted:_____
Present: Y N Y N
Engaged in: Y N Y N
Toys rotated: Y N
Notes:

11 to 12 Name:_____ Observed: _____

Posted activity: _____ Time posted:_____
Present: Y N Y N
Engaged in: Y N Y N
Toys rotated: Y N
Notes:

12 to 1 Name:_____ Observed: _____

Posted activity: _____ Time posted:_____
Present: Y N Y N
Engaged in: Y N Y N
Toys rotated: Y N
Notes:

Figure 7. Sample of hourly observation form used by observers.

AD	**ET**	**GU**	**LU**
SA	**AL**	**ME**	**SY**
	*	**IN**	**OUT**
V		**P**	Timer on/off

Figure 8. Picture of the Palm Pilot program for 15-second intervals.

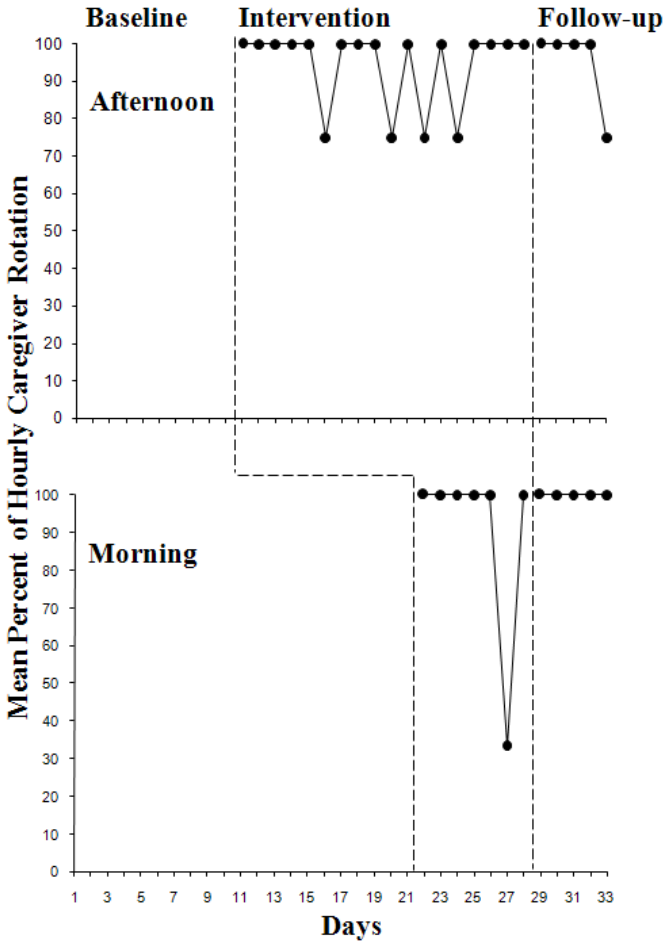


Figure 9. Mean percentage of hourly caregiver rotation per day during the intervention and follow-up conditions across caregivers.

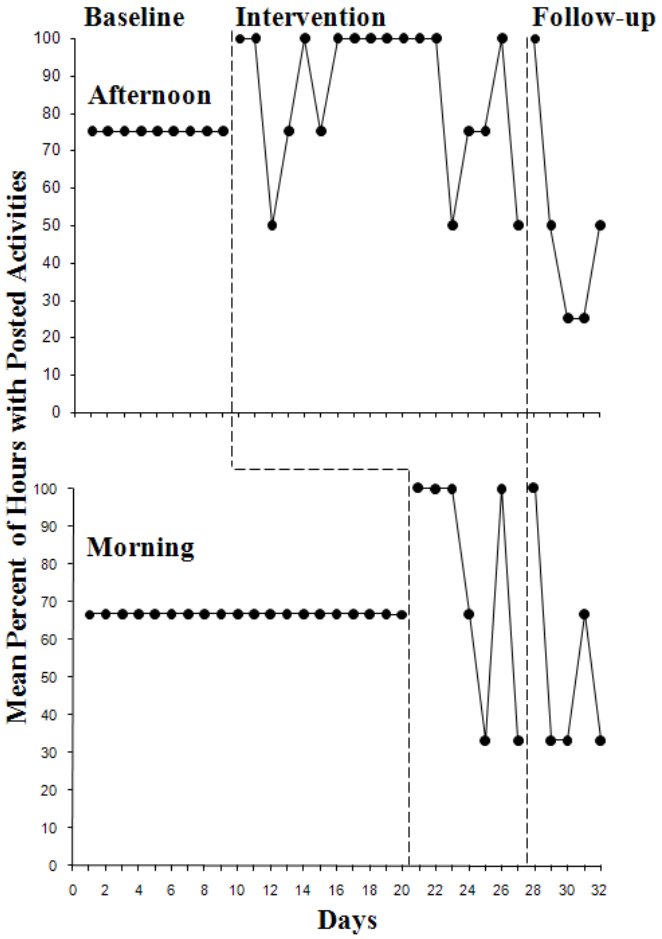


Figure 10. Mean percentage of hours with posted activities per day.

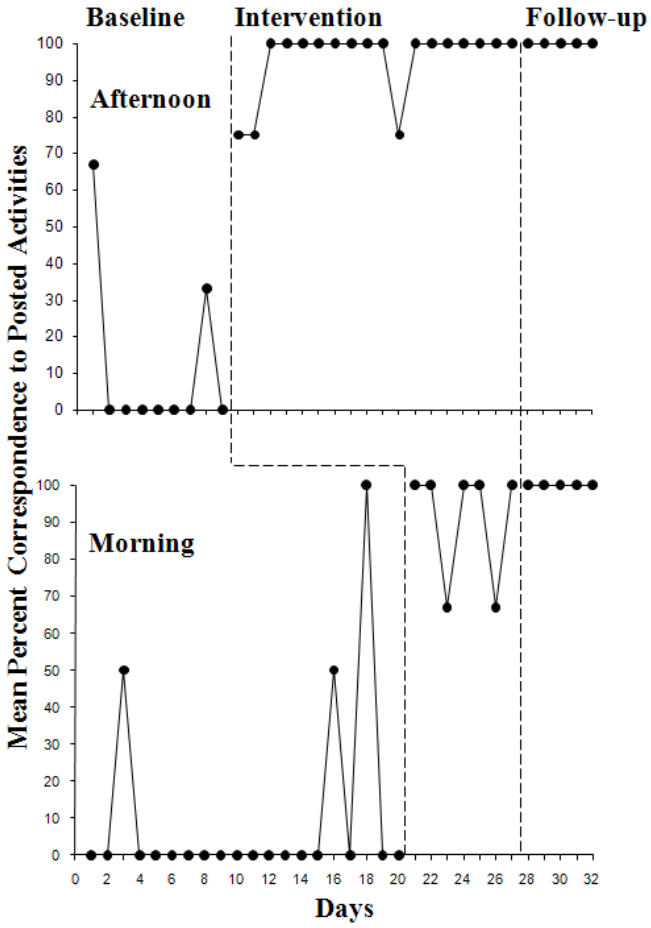


Figure 11. Mean percentage of caregiver correspondence to posted activities per day across caregivers.

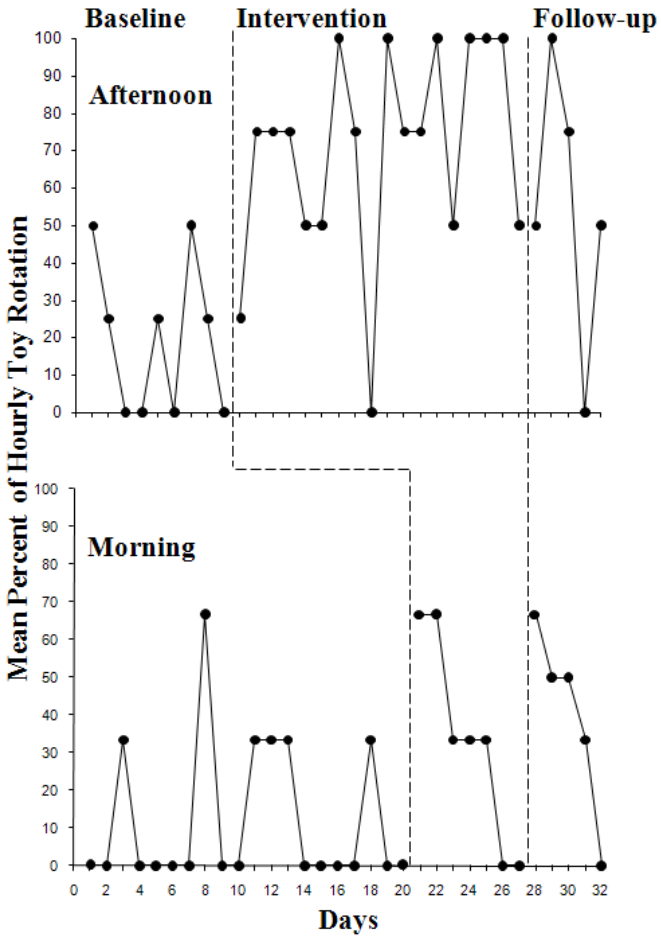


Figure 12. Mean percentage of hourly toy rotation per day across caregivers.

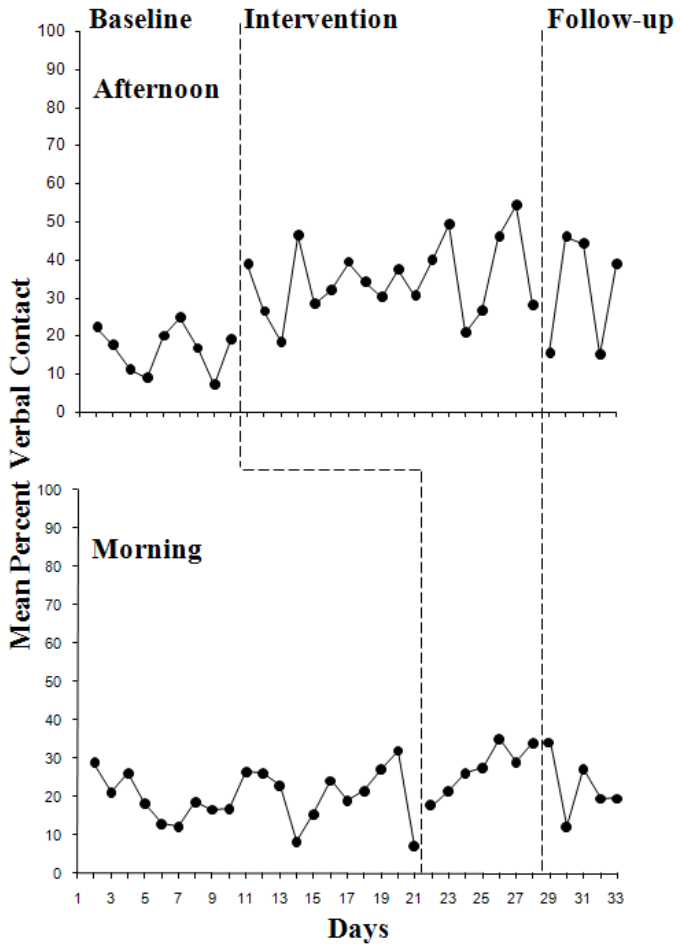


Figure 13. Mean percentage of intervals with caregiver verbal contact with infants across caregivers and infants.

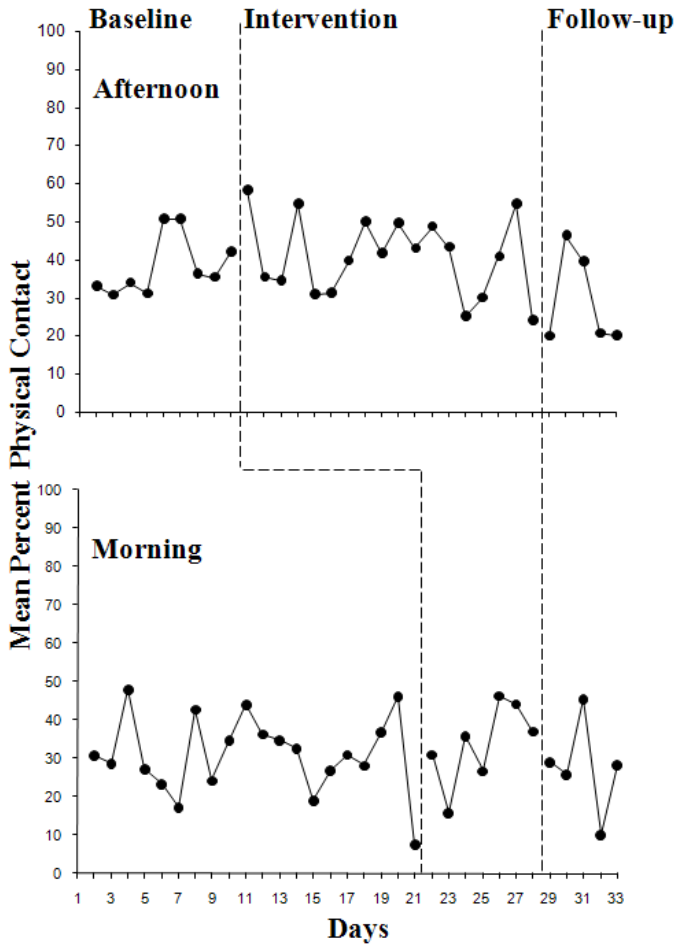


Figure 14. Mean percentage of intervals with caregiver physical contact with infants across caregivers and infants.